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Question and Answer BY POUL ANDERSON

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THE AMATEUR

One of the greatest problems of human civilization is that presented by the amateur. Each of us is, of course, an amateur in most fields of human endeavor; the greatest atomic physicist must be an amateur in most of the areas of living, actually. Einstein is an amateur to the surgeon, the psychologist, and the mechanical engineer.

But there lies in the amateur tremendous creativity, and the greatest probability for human advancement—that hasn't been adequately recognized, nor adequately handled.

Every new field of modern science, without exception, has been founded by an amateur. No new field of human advancement is ever started by a professional.

That statement that only amateurs, never professionals, open new fields of human advancement is rather a tricky one to evaluate; it does contain this semi-hidden flaw. Anyone founding a *new* field cannot, by definition, be a professional in *that* field; only his followers can be professionals. A professional is someone who is "trained and experienced in the work," a statement that can never be applied to the founder of a field of study.

But that simply makes the position of the amateur in human society harder to evaulate. It's evident that societies tend to suppress their deviants, whether the deviant is positive or negative. A society suppresses a Galileo, or a Hitler or moron. The crime is deviation, not the nature of the deviation.

And every man who starts a new field of human endeavor is necessarily a deviant—an amateur.

The problem is a tremendously vital one, too. Each time an amateur is finally accepted, and retitled "genius," the tendency of the society is to say, "Well, that was an exception. We'll let that one go—but no more now, mind you!"

But the amateur is *not* a phenomenon that can be ignored, if we are to have a successful, progressive

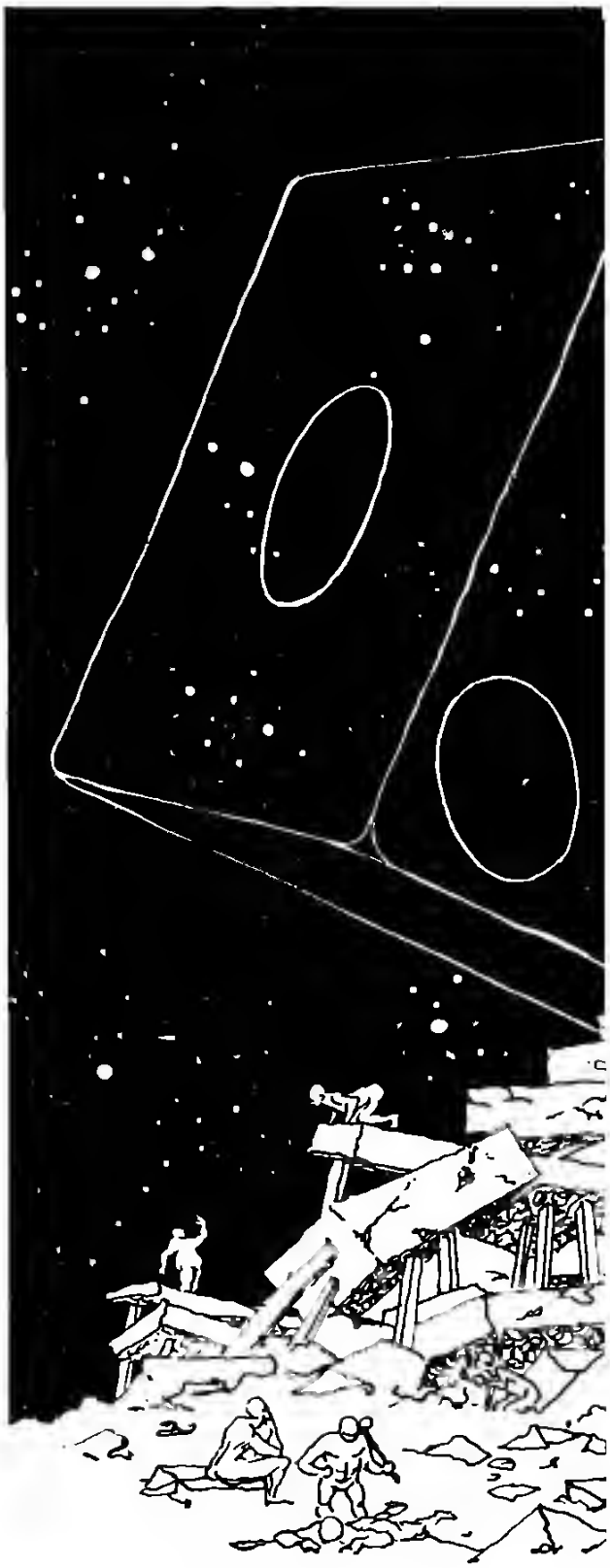
Continued on page 157

QUESTION AND ANSWER

BY POUL ANDERSON

***First** of Two Parts. The problems of an unknown, alien planet are bad enough—but when the expedition is a mis-matched group, and the only known thing about the planet is that the previous expedition vanished without trace, and then alien intelligences show up . . .*

Illustrated by Kelly Freas

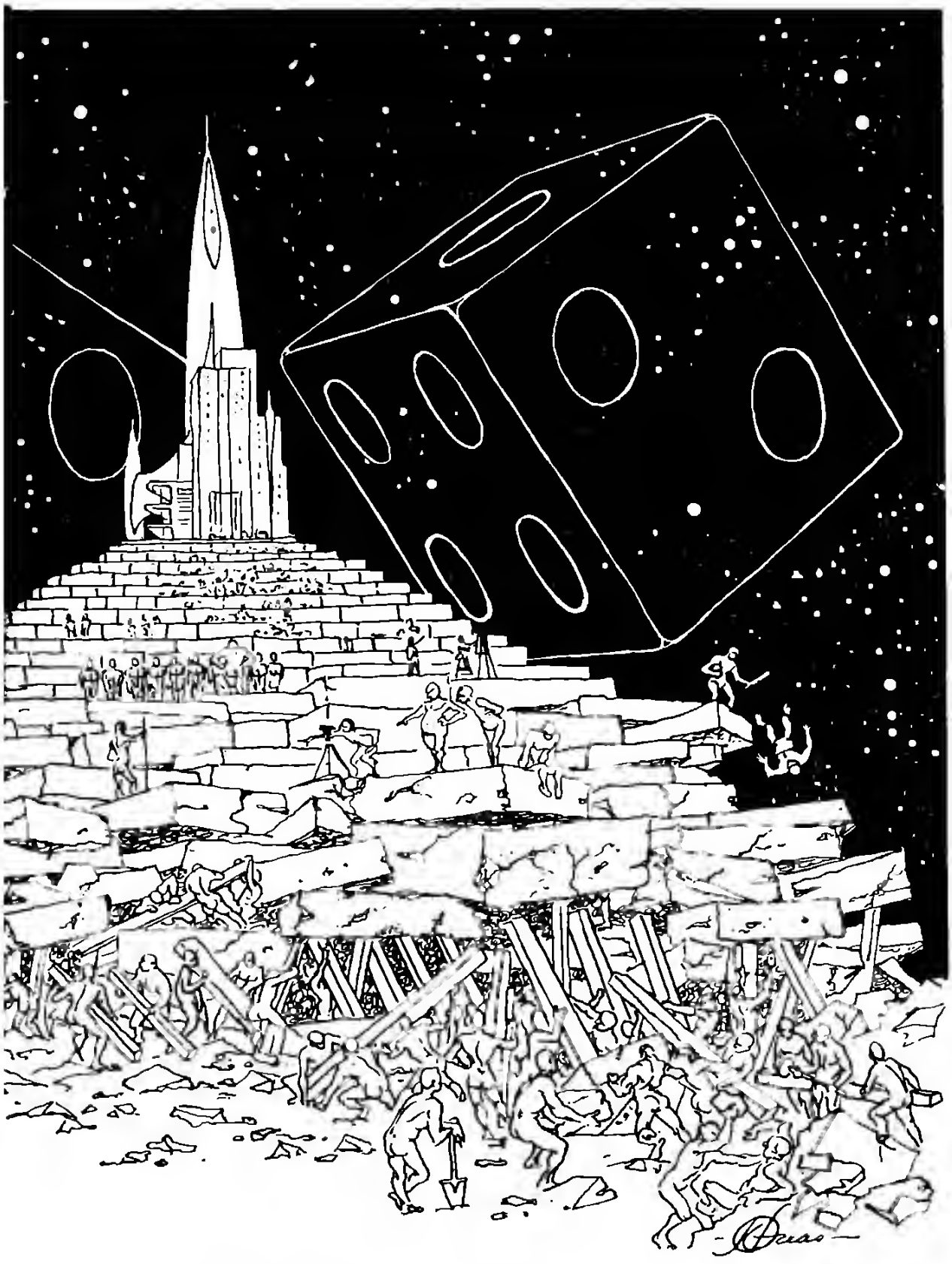


Wisdom is better than strength: nevertheless the poor man's wisdom is despised, and his words are not heard. The words of wise men are heard in quiet more than the cry of him that ruleth among fools. Wisdom is better than weapons of war: but one sinner destroyeth much good.

Ecclesiastes, ix, 16–18

I.

Somewhere a relay clicked, and somewhere else a robot muttered to



itself. Alarm lights shot through the spectrum to a hot and angry red, flashing and flashing, and a siren began its idiotic hoot.

"Get *out* of here!"

Three of the techs dropped what they were doing and shoved for a purchase against the nearest wall. The control panel was a yammer of crimson. Their weightless bodies slammed through the siren-raddled air toward the door.

"Come back here, you—!" They were gone before Kemal Gummus-lugil's roar was finished. He spat after them and grabbed a hand ring and pushed himself toward the panel.

Radiation, radiation, radiation, screamed the siren. Radiation enough to blaze through all shielding and come out with a fury that ionized the engine-room air and turned the alarm system crazy. But the effects were cumulative—Gummus-lugil got close enough to the meters to read them. The intensity was mounting, but he could stand half an hour of it without danger.

Why had they saddled him with a bunch of thumb-fingered morons so superstitious about gamma rays that they fled when the converter gave them a hard look?

He extended his arms before him, stopping his free-fall speed with fingertips and triceps. Reaching out for the manual cut-off, he slapped it down with a clank. Somehow the automatic safeties had failed to operate, and the nuclear fires in the converter were turning it into a small sun—but hell, a man could still stop the thing!

Other relays went to work. Baffle plates shot home, cutting off the fuel supply. The converter's power output was shunted to the generators, building up the damper fields which should stop the reaction—

And didn't!

It took seconds for Gummus-lugil to realize that fact. Around him, within him, the air was full of death; to an eye sensitive in the hard frequencies, his lungs must have glowed; but now the intensity should be dropping, the nuclei slowed in fighting the damper field till their speed dropped below resonance, and he could stop to find out what was wrong. He pulled his way along the giant panel toward the meters for the automatic safeties, and felt sweat prickling under his arms.

He and his crew had been testing the newly installed converter, nothing more. Something could have been wrong with one or another of the parts; but the immense complex of interlocking controls which was the engine's governor should have been self-regulating, foolproof, and—

The siren began hooting still louder.

Gummus-lugil felt his whole body grow wet. The fuel supply had been cut off, yes, but the reaction hadn't been stopped. No damper fields! Behind the casing, all the fires of hell were burning themselves out. It would

take hours before that was done, and everybody who stayed on the ship would be a dead man.

For an instant he hung there, aware of the endless falling sensation of weightlessness, aware of the noise and the vicious red lights. If they abandoned the ship in her orbit, she would be hot for days to come and the converter would be ruined. He had to flush the thing—now!

Behind him, the shielded bulkheads closed, and the ventilation system stopped its steady whirr. The ship's robomonitors would not let poison spread too swiftly through her entire body. They, at least, were still functioning. But they didn't care about him, and radiation was eating at his flesh.

He bit his teeth together and got to work. The emergency manuals still seemed O.K. He spoke into his throat mike: "Gummus-lugil to bridge. I'm going to flush this thing. That means the outside hull will be hot for a few hours. Anybody out there?"

"No." The supervisor's voice sounded small and scared. "We're all standing by the lifeboat locks. Don't you think we should just abandon ship and let her burn herself out?"

"And ruin a billion solars' worth of engine? No, thanks! Just stay where you are, you'll be O.K." Even in this moment, the engineer snorted. He began turning the main flushing wheel, bracing his feet against his body's tendency to rotate the other way.

The auxiliaries were purely mechanical and hydraulic—for which praises be the designers, now when all electronic equipment seemed to have gone mad. Gummus-lugil grunted, feeling the effort in his muscles. A series of ports opened. The rage of more-than-incandescent gases spilled out into space, a brief flame against darkness and then nothing the human eye could see.

Slowly, the red lights dulled to yellow and the siren moderated its voice. The radioactivity in the engine room was falling off already. Gummus-lugil decided that he'd not had a harmful dose, though the doctors would probably order him a couple of months off the job.

He went through the special safety exit; in the chamber beyond, he shucked his clothes and gave them to the robot. Beyond that, there were three successive decontamination rooms; it took half an hour before a Geiger proclaimed him fit for human society. He slipped on the coverall which another robot handed him and made his way to the bridge.

The supervisor shrank from him, just a trifle, as he entered. "All right," said Gummus-lugil sarcastically. "I know I'm a little radioactive yet. I know I should go ringing a bell and crying, 'Unclean! Unclean!' But right now I want to make a call to Earth."

"Huh . . . oh, yes, yes. Of course." The supervisor scurried through the

air toward the com-desk. "Where to?"

"Lagrange Institute head office."

"What . . . went wrong? Do you know?"

"Everything. More than could possibly happen by chance. If I hadn't been the only man aboard with the brains of an oyster, the ship would've been abandoned and the converter ruined."

"You don't mean—"

Gummus-lugil raised his fingers and ticked them off one by one: "S, A, B, O, T, A, G, E spells 'sabotage.' And I want to get the one who did it."

II.

John Lorenzen was looking out of his hotel window when the call came. He was on the fifty-eighth floor, and the sheer drop down made him feel a little dizzy. They didn't build that high on Luna.

Below him, above him, around him, the city was like a jungle, airy flex-bridges looping from one slim tower to the next; and it glowed and burned with light, further out than he could see, over the curve of the world. The white and gold and red and royal blue illumination wasn't continuous; here and there a wide patch of black showed a park, with a fountain of fire or glowing water in the middle of its night; but the lights reached for many kilometers. Quito never slept.

It was near midnight, when a lot of rockets would be taking off. Lorenzen wanted to see the sight; it was famous in the Solar System. He had paid double price for a room facing the wall of the spaceport: not without twinges of conscience, for the Lagrange Institute was footing the bills, but he'd done it. A boyhood on a remote Alaskan farm, a long grind through college—the poor student going through on scholarships and assistantships—and then the years at Luna Observatory, hadn't held anything like this. He wasn't complaining about his life, but it hadn't been anything very spectacular either, and if now he was to go into the great darkness beyond the sun, he ought to see Quito Spaceport at midnight first. He might not have another chance.

The phone chimed gently. He started, swearing at his own nervousness. There wasn't anything to be scared of. They wouldn't bite him. But the palms of his hands were wet.

He stepped over and thumbed the switch. "Hello," he said.

A face grew in the screen. It wasn't a particularly memorable face—smooth, plump, snub-nosed, thin gray hair—and the body seemed short and stout. The voice was rather high but not unpleasant, speaking in North American English: "Dr. Lorenzen?"

"Yes. Who . . . is this, please?" In Lunopolis, everybody knew everybody else, and trips to Leyport and Ciudad Libre had been rare. Lorenzen wasn't used to this welter of strangers.

And he wasn't used to Earth gravity or changeable weather or the thin cool air of Ecuador. He felt lost.

"Avery. Edward Avery. I'm with the government, but also with the Lagrange Institute—sort of liaison man between the two, and I'll be going along on the expedition as psychomed. Hope I didn't get you out of bed?"

"No . . . no, not at all. I'm used to irregular hours. You get that way on Luna."

"And in Quito too—believe me." Avery grinned. "Look, could you come over and see me?"

"I . . . well . . . now?"

"As good a time as any, if you aren't busy. We can have a few drinks, maybe, and talk a little. I was supposed to approach you anyway, while you were in town."

"Well . . . well, yes, sure, I suppose so." Lorenzen felt rushed off his feet. After the leisurely years on the Moon, he couldn't adapt to this pace they had on Earth. He wanted to spit in somebody's eye and tell him they'd go at his, Lorenzen's, speed for a change; but he knew he never would.

"Good, fine. Thanks a lot." Avery gave him the address and switched off.

A low rumble murmured through the room. The rockets! Lorenzen hurried back to the window and saw the shielding wall like the edge of the world, black against their light. One, two, three, a dozen metal spears rushing upward on flame and thunder, and the Moon a cool shield high above the city—yes, it was worth seeing.

He dialed for an aircab and slipped a cloak over his thin lounging pajamas. The 'copter appeared in minutes, hovering just beyond his balcony and extending a gangway. He walked in, feeling his cloak grow warm as it sucked power from the 'cast system, and sat down and punched out the address he wanted.

"*Dos solarios y cincuenta centos, por favor.*"

The mechanical voice made him feel embarrassed, he barely stopped himself from apologizing as he put a tenner in the slot. The autopilot gave him his change as the cab swung into the sky.

He was let off at another hotel—apparently Avery didn't live permanently in Quito either—and made his way down the hall to the suite named. "Lorenzen," he said to the door, and it opened for him. He walked into an anteroom, giving his cloak to the robot, and was met by Avery himself.

Yes, the psychman was pretty short. Lorenzen looked down from his own gaunt height as he shook hands. He was only about half Avery's age, he guessed—a tall skinny young man who didn't quite know where to put his feet, unkempt brown hair, gray eyes, blunt homely features with the smooth even tan of Lunar sun-type fluoros.

"Very glad you could come, Dr. Lorenzen." Avery looked guilty and

lowered his voice to a whisper. "Afraid I can't offer you that drink right now. We've got another expedition man here . . . came over on business . . . a Martian, you know—"

"Huh?" Lorenzen caught himself just in time. He didn't know if he'd like having a Martian for crewmate, but it was too late now.

They entered the living room. The third man was already seated, and did not rise for them. He was also tall and lean, but with a harshness to his outlines that the tight black clothes of a Noachian Dissenter did not help; his face was all angles, jutting nose and chin, hard black eyes under the close-cropped dark hair.

"Joab Thornton—John Lorenzen—please sit down." Avery lowered himself into a chair. Thornton sat stiffly on the edge of his, obviously disliking the idea of furniture which molded itself to his contours.

"Dr. Thornton is a physicist—radiation and optics—at the University of New Zion," explained Avery. "Dr. Lorenzen is with the observatory at Lunopolis. Both you gentlemen will be going to Lagrange with us, of course. You might as well get acquainted now." He tried to smile.

"Thornton . . . haven't I heard your name in connection with X-ray photography?" asked Lorenzen. "We've used some of your results to examine the hard spectra of stars, I believe. Very valuable."

"Thank you." The Martian's lips creased upward. "The credit is not to me but to the Lord." There didn't seem to be any answer for that.

"Excuse me." He turned to Avery. "I want to get this over with, and they said you were the expedition's official wailing wall. I've just been looking over the personnel list and checking up on the records. You have one engineer down by the name of Reuben Young. His religion—if you can call it that—is New Christian."

"Um-m-m . . . yes—" Avery dropped his eyes. "I know your sect doesn't get along with his, but—"

"Doesn't get along!" A vein pulsed in Thornton's temple. "The New Christians forced us to migrate to Mars when they were in power. It was they who perverted doctrine till all Reformism was a stink in the nostrils of the people. It was they who engineered our war with Venus." (*Not so*, thought Lorenzen, *part of it had been power rivalry, part of it the work of Terrestrial psychmen who wanted their masters to play Kilkenny cat.*) It is still they who slander us to the rest of the Solar system. It is their fanatics who make it necessary for me to carry a gun here on Earth." He gulped and clenched his fists. When he spoke again, it was quietly:

"I am not an intolerant man. Only the Almighty knows the just from the unjust. You can have as many Jews, Catholics, Moslems, Unbelievers, Collectivists, Sebastianists, and I know not what else along as you choose.

But by joining the expedition I take on myself an obligation: to work with, and perhaps to fight with and save the life of, everyone else aboard. I cannot assume this obligation toward a New Christian.

"If Young goes along, I don't. That's all."

"Well . . . well—" Avery ran a hand through his hair, an oddly helpless gesture. "Well, I'm sorry you feel that way—"

"Those idiots in the government supposedly running our personnel office for us should have known it from the start."

"You wouldn't consider—"

"I wouldn't. You have two days to inform me that Young has been discharged; thereafter I book passage back to Mars."

Thornton got up. "I'm sorry to be so rude about it," he finished, "but that's the way it is. Speak to the office for me. I'd better be going now." He shook Lorenzen's hand. "Glad to have met you, sir. I hope the next time will be under better conditions. I'd like to ask you about some of that X-ray work."

When he was gone, Avery sighed gustily. "How about that drink? I need one bad myself. What an off-orbit!"

"From the realistic point of view," said Lorenzen cautiously, "he was right. There'd have been murder if those two were on the same ship."

"I suppose so." Avery picked up the chair mike and spoke to the Room-Serv. Turning back to his guest: "How that slip-up occurred, I don't know. But it doesn't surprise me. There seems to be a curse on the whole project. Everything's gone wrong. We're a year behind our original schedule, and it's cost almost twice the estimate."

The RoomServ discharged a tray with two whiskies and soda; it landed on the roller table, which came over to the men. Avery picked up his glass and drank thirstily. "Young will have to go," he said. "He's just an engineer, plenty more where he came from; we need a physicist of Thornton's caliber."

"It's strange," said Lorenzen, "that a man so brilliant in his line—he's a top-flight mathematician too, you know—should be a . . . Dissenter."

"Not strange." Avery sipped moodily. "The human mind is a weird and tortuous thing. It's perfectly possible to believe in a dozen mutually contradictory things at once. Few people ever really learn how to think at all; those who do, think only with the surface of their minds, the rest is still conditioned reflex and rationalization of a thousand subconscious fears and hates and longings. We're finally getting a science of man—a *real* science; we're finally learning how a child must be brought up if he is to be truly sane. But it'll take a long time before the results show on any large scale:

there is so much insanity left over from all our history, so much built into the very structure of human society."

"Well—" Lorenzen shifted uneasily. "I daresay you're right. But, uh, about the business at hand . . . you wanted to see me—"

"Just for a drink and a talk," said Avery. "It's my business to get to know every man on the ship better than he knows himself. But that'll also take time."

"You have my psych tests from when I volunteered for the expedition," said Lorenzen. His face felt hot. "Isn't that enough?"

"No. So far, you're only a set of scores, multi-dimensional profiles, empirical formulas and numbers. I'd like to know you as a human being, John. I'm not trying to pry. I just want to be friends."

"All right." Lorenzen took a long drink. "Fire away."

"No questions. This isn't an analysis. Just a conversation." Avery sighed again. "I'll be glad when we get into space! You've no idea what a rat race the whole business has been, right from the first. If our friend Thornton knew all the details, he'd probably conclude it wasn't God's will that man should go to Troas. He might be right, at that. Sometimes I wonder."

"The first expedition got back—"

"That wasn't the Lagrange expedition. That was a shipful of astronomers, simply investigating the stars of the Hercules cluster. They found the Troas-Ilium system in the course of studying the Lagrange suns, and took some data from space—enough to make a planetographic survey seem worth while—but they didn't land.

"The first *real* Lagrange expedition never came back."

There was silence in the room. Outside the broad windows the night city burned against darkness.

"And we," said Lorenzen finally, "are the second—"

"Yes. And everything has been going wrong, I tell you. First the Institute had to spend three years raising the money. Then there were the most fantastic mix-ups in their administration. Then they started building the ship—they couldn't just buy one, everything was committed elsewhere—and there were delays all along the line. This part wasn't available, that part had to be made special—it ran the time of building, and the cost, way over estimate. Then—this is confidential, but you might as well know it—there was sabotage. The main converter went wild on its first test. Only the fact that one man stuck by his post saved it from being a total loss. Even as it was, the repairs and the delay exhausted the Institute's treasury, and there was another pause while they raised more money. It wasn't easy; public apathy toward the whole idea of colonization is growing with each failure.

"They're almost ready now. There are still hitches—this business tonight was just a small sample—but the job is almost done." Avery shook his head. "It's fortunate that the directors of the Institute, and Captain Hamilton, and a few others, have been so stubborn about it. Ordinary men would have given up years ago."

"Years . . . yes, it's about seven years since the first expedition—disappeared, isn't it?" asked Lorenzen.

"Uh-huh. Five years since the Institute started planning this one."

"Who . . . who were the saboteurs?"

"Nobody knows. Maybe some fanatic group with its own distorted motives. There are a lot of them, you know. Or maybe . . . no, that's too fantastic. I'd rather assume that Lagrange Expedition II has had a run of bad luck, and hope that the run is about over."

"And Expedition I?" asked Lorenzen softly.

"I don't know. Who does? It's one of the things we're supposed to find out."

They were quiet then for a long time. The unspoken thought ran between them: *It looks as if somebody or something doesn't want men on Troas. But who, and why, and how?*

We're supposed to find the answer. But we're also supposed to bring the answer back. And the first expedition, as well equipped and as well manned as ours, did not return.

III.

". . . Interstellar distances have become almost meaningless with the invention of the warp drive; within an enormous range, it does not take appreciably more time and energy to go one hundred thousand light-years than to go one. As a natural result, once the nearer stars had been visited, explorers from Sol have been investigating the most interesting ones in the galaxy, even though many of these lie very far indeed from home, and temporarily ignoring the millions of intervening, but quite ordinary, suns. In the twenty-two years since the first Alpha Centauri expedition, hundreds of stars have been reached; and if the hope of finding Earth-like planets for colonization has so far been blasted, the reward in terms of scientific knowledge has been considerable.

"The first expedition to the Hercules cluster was purely astronomical, the personnel being interested only in the astrophysics of the cluster: a dense group composed of millions of stars belonging to Population II, with a surrounding space singularly clear of dust and gases. But while circling the double star Lagrange, the observers detected a planet and investigated. It turned out to be a double planet, the larger remarkably terrestroid; from its Trojan position, it was named Troas, the smaller companion named Ilium. Lacking facilities for planetfall, the expedition necessarily contented

itself with studies from space

Lorenzen put down the pamphlet with a sigh. Almost, he knew it by heart. Spectrographic data on the atmosphere, yes, and the vegetation observed seemed to hold chlorophyl. Calculations of mass and surface gravity. Thermocouples confirming what the maps showed: a world still in the clutch of glaciers, but the equatorial regions cool and bracing, a climate which knew snow and storm but also the flowering of summer. A world where men could perhaps walk unarmored, and build homes and farms and cities, a world where men could possibly grow roots and belong. The seven billion humans jammed into the Solar System were crying for a place to go. And during his lifetime he had seen the slow withering of the dream.

It had been foreseen, of course, but no one had believed it till one ship after another had come trailing home, the dust of stars on her battered hull, to bring the word. In all the galaxy's swarming myriads of planets, there might be none where men could strike roots.

Life on Earth is such a delicate balance of chemical, physical, and ecological factors, many of them due to sheer geological or evolutionary accident, that the probability of a world where men could live without elaborate artificial aids is lower than one dares think. First you have to find an oxygen atmosphere, the proper range of radiation and temperature, a gravity

not too small to let the air escape and not so great as to throw the human body-fluid adjustment out of kilter. That alone winnows the worlds like some great machine; you have less than one per cent left. And then you have to start on the biology of it. Vegetation nourishing to man, and the domestic animals which can eat it, cannot grow without a gigantic web of other life, most of it microscopic: nitrogen-fixing bacteria, saprophytes, earthworms—and these cannot simply be seeded on a new world, for they in turn are dependent on other life-forms. You have to give them an ecology into which they can fit. A billion years of separate evolution will most likely produce native life which is inedible or sheer poison; what, for instance, are the odds against the duplication of all the vitamins?

Mars and Venus and the Jovian moons had been colonized, yes, but it had been at enormous expense and for special reasons—mining, penal colonies, refugees during two centuries of war and tyranny; their system of domes and tank food could never support many, however hard you tried. Now when the stars were open, nobody wanted another hell-planet. In money terms— which, ultimately, means in terms of value received for effort expended—it wouldn't pay.

A few worlds which might have been colonizable—and all of them held diseases to which man had no racial immunity whatsoever, which would surely wipe out ninety per cent of any colony before serums and vaccines could be developed. (The dying crew of the *Magellan*, returning from Sirius to radio their tragic message before they plunged their ship into the sun.) Or there were natives, unhuman beings as bright as man, often with their own technologies not too far behind his. They would resist invasion, and the logistics of interstellar conquest were merely ridiculous. Balancing the cost of sending colonists and their equipment—lives, too-scarce material resources, blood, sweat, and tears—and the cost of sending soldiers, against the probable gain—a few million humans given land, and the economics of space travel such that they could ship little of value back to Sol—yielded a figure too far in the red. Conquest was theoretically possible, but a war-exhausted humanity, most of it still living near the starvation level, wasn't that interested in empire.

Wanted: Terrestroid planets, habitable but uninhabited, clean of major sicknesses, rich enough to support colonists without help from Sol.

Found: In almost a generation, nothing.

Lorenzen remembered the wave of excitement which had followed the return of the Hercules expedition. He had still been a boy then—that was the year before he got the scholarship to Rio Polytechnic—but he, too, had looked up, through a wintry Alaskan

night to the cold arrogance of the stars; he had also flung his head back with a laugh.

And the *Da Gama* had set out and had left Sol behind her. And after two years, men shrugged with a weariness that was dying hope. Murdered by natives or by microbes, gulped down when the earth opened under them, frozen by a sudden blast from the glacial north—who knew? Who cared? You heard little talk nowadays about New Earth; no utopian schemes for the fresh start man was going to make were being published; more and more, men put their shoulders to the tired old wheel of Earth, resigned to this being their only home and their only hope through all time forever.

"Two swallows do not make a summer. . . . Statistically inadequate sample. . . . Statistical certainty that *somewhere* there must be—" But funds for more investigations where whittled down in every session of Parliament. More and more of the great star ships swung darkly about Earth while their captains begged for finances. And when the Lagrange Institute dug into its own treasury to buy one of them, it could not be done, there was always a reason. "Sorry, but we want to keep her; as soon as we can raise the money, we want to try an idea of our own. . . . Sorry, but she's already committed; leaving in two months for a xenological expedition to Tau Ceti. . . . Sorry, but we're converting her to an interplanetary freighter, that's where the money is. . . . Sorry." The *Henry Hudson* had to be built from scratch.

The Egyptains sailed to Punt, and could easily have gone further; with a little development, their ships could have reached the Indies. The Alexandrians built an aeolipile, but there was enough slave labor around so that they had no reason to go on from there and make a steam turbine. The Romans printed their maps, but didn't apply the idea to books. The Arabs developed algebra and then got more interested in theological hairsplitting. Something has always lain within the grasp of man which he just didn't care to take hold of. Society must want something enough for the wish to become an actual need before it gets the thing.

The starward wish was dying.

IV.

Sol was two billion kilometers behind them, little more than the brightest star in a frosty swarm, when they went into warp. The engines roared, building up toward the potentials beyond which the omega effect set in; there was a wrenching dizziness as the ship and her crew leaped out of normal energy levels; night and confusion while the atoms readjusted in their non-Dirac matrices; and then quiet, and utter blind blackness outside the viewports.

It was like an endless falling through

nullity. The ship could not accelerate, could not spin, for there was nothing which she could move in relation to; for the duration of the trip, she was *irrelevant* to the four-dimensional universe. Weight came back as the inner hull started rotating with respect to the outer, though Lorenzen had already been sick—he never could stand free fall. Then there was nothing to do but settle down for the month or so it would take to reach Lagrange.

And the days passed, swept out by clocks, unmarked by any change—they were only waiting now, doubly held in timelessness. Fifty men, spacers and scientists, fretted out the emptiness of hours and wondered what lay on the other end of the warp.

It was on the fifth day when Lorenzen and Tetsuo Hideki wandered down toward the main lounge. The Manchurian was one of the organic chemists: a small, frail-looking, soft-spoken fellow in loose robes, timid with people and highly competent in his work. Lorenzen thought that Hideki made a barrier against the world out of his test tubes and analyzers, but he rather liked the Asian. *I've done pretty much the same myself, haven't I? I get along all right with people, yes, but down underneath I'm afraid of them.*

". . . But why cannot you say that it takes us a month to go to Lagrange? That is the time we measure aboard ship, is it not? It is also the time a Lagrangian or Solarian observer would measure between the moment we entered the warp and the moment we came out."

"Not quite," said Lorenzen. "The math shows that it's meaningless to equate time measured inside the warp with time measured outside. It's not even similar to the time-shift in classical relativity. In the omega-effect equations, the t and t' are two distinct expressions, two different dimensions; they have about the same numerical value, but the conversion factor is not a pure number. The fact that time spent in the warp is about the same no matter how far you go—within a terrifically big radius, up to the point where space curvature becomes significant—indicates that we don't have a true velocity at all." He shrugged. "I don't pretend to understand the whole theory. Not a dozen men can."

"This is your first interstellar trip, is it not, John?"

"Uh-huh. I've never been farther than the Moon before."

"I have never even been off Earth. I believe Captain Hamilton and a couple of the engineers are the only men aboard who have flown the star ways before now. It is strange." Hideki's eyes looked scared. "There is much which is strange about this trip. I have never heard of so ill-assorted a crew."

"N-n-no." Lorenzen thought over those he knew anything about. There had already been clashes, which Avery had not succeeded very well in smoothing over. "But the Institute had to

take what it could get, I suppose, and there are all too many lunatic opinions left over from the wars and the Interregnum. Political fanatics, racial fanatics, religious fanatics—" His voice trailed off.

"I take it you support the Solar government?"

"Sure. I may not like everything it does, but it's got to compromise with many elements if it's to be democratic, and stamp out many others if it's to survive. It's all that stands between us and a return of anarchy and tyranny."

"You are right," said Hideki. "War is a monster—my people know that." There was a darkness in his eyes. Lorenzen wondered if he was thinking of the Mongku Empire which Mars had shattered, or if his thoughts went still farther back, to the lovely lost islands of Japan and the Fourth World War which had sunk them under the sea.

They came to the entrance of the lounge and paused, looking in to see who was there. It was a big, low room, its furniture and drapes and gentle illumination a rest from the impersonal metallic harshness which was most of the ship; but it seemed rather bare, the Institute had not had time or money to decorate it properly. They should have taken time, thought Lorenzen. Men's nerves were worn thin out here between the stars, they needed murals and a bar and a fireplace full of crackling logs. They needed home.

Avery and Gummus-lugil, the ship's chess fiends, were hunched over a board. Miguel Fernandez of Uruguay, geologist, a small dark lively young man, sat thrumming a guitar; near him was Joab Thornton, reading his Bible—no, it was Milton this time, and there was a curious lost ecstasy on the ascetic features. Lorenzen, who dabbled with art, thought that the Martian had a fascinating set of angles and planes in his face; he'd like to do his portrait sometime.

Gummus-lugil looked up and saw the newcomers. He was a dark, stocky man, his face broad and hooknosed, his shirt open over a wiry pelt. "Hello, there," he said cheerfully.

"Hello," said Lorenzen. He rather liked the Turk. Gummus-lugil had come up the hard way, it had marked him: he was rude and dogmatic and had no use for literature; but his mind was good, he and Lorenzen had already sat through several watches arguing politics and analytical philosophy and the chances of the Academy team getting the meteor polo pennant next year. "Who's ahead?"

"He is, I'm afraid."

Avery reached out and advanced a bishop. "Guard queen," he said. His voice remained almost apologetic.

"Huh? Oh, yes . . . yes—Let's see—" Gummus-lugil swore. "This is going to cost me a knight. O.K., O.K." He moved.

Avery avoided the knight, but took a pawn with his rook. "Mate in—five moves," he said. "Care to resign?"

"Whuzzat?" Feverishly, Gummus-lugil studied the board. Fernandez's fingers rippled down a chord.

"You see, here . . . and here . . . and then—"

"Stop that racket!" snarled Gummus-lugil. "How d'you expect me to concentrate?"

Fernandez flushed angrily. "I have as much right—"

Gummus-lugil showed his teeth. "If you could play, it'd be all right," he snapped. "But go do your caterwauling somewhere else, sonny boy."

"Hey, there, Kemal, take it easy—" Avery looked alarmed.

Surprisingly, Thornton joined in on the engineer's side. "This should be a place for peace and quiet," he clipped. "Why don't you go play in your bunkroom, Señor Fernandez?"

"There are men off watch there who have to sleep," answered the Uruguayan. He stood up, knotting his fists together. "And if you think you can dictate to the rest of us—"

Lorenzen stood back, feeling the helpless embarrassment which quarrels always gave him. He tried to say something, but his tongue seemed thick in his mouth.

Friedrich von Osten chose that moment to enter. He stood in the farther doorway, swaying a little—it was well known he'd smuggled a case of whisky aboard. He wasn't an alcoholic, but there were no women along and he couldn't be polishing his beloved guns forever. A mercenary soldier in the ruins of Europe—even if he does get picked up for the Solar Academy, and makes good in the Patrol, and is named chief gunner for a star ship—doesn't develop other interests.

"Vot iss?" he asked thickly.

"None of your business!" flared Gummus-lugil. Their two jobs had already required them to work together a lot, and they just didn't get along; two such arrogant souls couldn't.

"I make it my business, den." Von Osten stepped forward, hunching his great shoulders; the yellow beard bristled, and the wide battered face was red. "So you are picking on Miguel again?"

"I can handle my own affairs," stated Fernandez flatly. "You and this Puritan crank can stay out of them."

Thornton bit his lip. "I wouldn't talk about cranks," he said, rising to his own feet.

Fernandez got a wild look about him. Everybody knew that his family on the mother's side had spearheaded the Sebastianist Rebellion a century ago; Avery had quietly passed the word along with a warning not to mention it.

"Now, Joab—" The government man hastened toward the Martian, waving his hands in the air. "Now

take it easy, gentlemen, please—"

"If all you fuse-blown gruntbrains would mind your own business—" began Gummus-lugil.

"Iss no such t'ing as own business here!" shouted von Osten. "Ve iss all *zusammen*—togedder, and I vould vish to put you under Patrol discipline vun day only!"

Trust him to say exactly the wrong thing at the wrong moment, thought Lorenzen sickly. *His being essentially right only makes it the more insufferable.*

"Look—" He opened his mouth, and the stutter that always grabbed him when he was excited made him wordless again.

Gummus-lugil took a stiff-legged step toward the German. "If you want to step outside a minute, we'll settle that," he said.

"*Gentlemen!*" wailed Avery.

"Are they, now?" asked Thornton.

"*Und du kannst auch herausgehen!*" bellowed von Osten, turning on him.

"Nobody insults me," snarled Fernandez. His small wiry body gathered itself as if to attack.

"Keep out of this, sonny," said Gummus-lugil. "It's bad enough your starting it—"

Fernandez made a noise that was half a sob and jumped for him. The Turk sprang back in surprise. When a fist grazed his cheek, his own leaped out and Fernandez lurched back.

Von Osten yelled and swung at Gummus-lugil. "Give me a hand," gasped Avery. "Get them apart!" He almost dragged Thornton along with him. The Martian got a grip on von Osten's waist and pulled. The German kicked at his ankles. Thornton snapped his lips together over a cry of pain and tried to trip his opponent. Gummus-lugil stood where he was, panting.

"What the devil is going on here?"

They all turned at that shout. Captain Hamilton stood in the doorway.

He was a tall man, solidly built, heavy-featured, thick gray hair above the deep-lined face; he wore the blue undress uniform of the Union Patrol, of which he was a reservist, with mathematical correctness; his normally low voice became a quarterdeck roar, and the gray eyes were like chill iron as they swept the group.

"I thought I heard a quarrel in here—but a brawl!"

They moved away from each other, sullenly, looking at him but not meeting his gaze.

He stood for a very long while, regarding them with a raking contempt. Lorenzen tried to make himself small. But down somewhere inside himself, he wondered how much of that expression was a good job of acting. Hamilton was a bit of a martinet, yes, and he'd had himself psyched as thoroughly as he could be, to get rid of all fears and complusions irrelevant to his work—but he couldn't be that much of a machine. He had children and grandchildren in Canada; he liked

gardening; he was not unsympathetic when—

"All of you here have university degrees." The captain was speaking very quietly now. "You're educated men, scientists and technicians. You're the cream of Sol's intellect, I'm told. Well, if you are, God help us all!"

There was no answer.

"I suppose you know expeditions like this are dangerous enough at best," went on Hamilton. "I also believe you were told that the first expedition to Troas never got back. To me, it seems reasonable that if we're to survive at all, we have to make a team and work together against whatever it was that killed the first ship. Apparently it does not seem so to you."

He grinned with careful nastiness. "Presumably you scientists also think I'm just the pilot. I'm just a conductor whose only business is to get you to Troas and back. If you believe that, I advise you to read the articles again —assuming you can read. I'm responsible for the safety of the whole ship, including your lives, God help me. That means I'm the boss, too. From the moment you entered the air lock at Earth to the moment you leave it again back at Earth, I'm the boss.

"I don't care who started this or who did what in which manner to whom. It's enough that there was a fight where there shouldn't have been one. You're all going in the brig for a day—without food. Maybe that'll teach you some manners."

"But I didn't—" whispered Hideki.

"Exactly," snapped Hamilton. "I want every man aboard to have a vested interest in preventing this sort of thing. If your lives, and the lives of everybody else, don't matter to you, maybe your fat-gutted bellies will."

"But I *tried*—" wailed Avery.

"And failed. A rust-eaten failure if I ever saw one. You get brigged for incompetence, Mr. Avery. It's your job to see that tensions don't build up this way. All right, now—march!"

They marched. Not a word was said.

Somewhat later, Hideki murmured in the darkness of the brig: "It isn't fair. Who does he think he is?"

Lorenzen shrugged, his own easy-going temperament asserting itself. "Does it matter?"

"But if he keeps this up, everyone will hate him!"

"I imagine he's a pretty good rule-of-thumb psychman himself. Quite probably that's what he wants."

Later, lying in blindness on a hard narrow bunk, Lorenzen wondered what had gone wrong. Avery talked to all the men privately, counseled them, tried to ease their fears and hatreds so that they wouldn't turn on others. At least, he was supposed to. But he hadn't. Maybe there was a curse on Lagrange after all.

V.

The sky was incredible.

Here in the center of the great cluster, the double star was a double blaze. Lagrange I seemed as bright as Sol, though only half the apparent size, a blue-green flame ringed with eerie halos of corona and zodiacal light; when the glare was filtered out, you could see prominences monstrous on its rim. Lagrange II, a third of Sol's angular diameter but almost as luminous, was a rich orange-red. When both their lights streamed through the viewports into a darkened room, men's faces had an unearthly color, they seemed themselves transfigured.

The stars were so brilliant that some of them could be seen even through that haze of radiance. When you looked out from the shadow side of the ship, the sky was a hard crystal black spattered with stars—great unwinking diamonds, flashing and flashing, confused myriads, a throng of them glittering in a glory such as Earth's dwellers had never seen. It was lonely to think that the light of them which Earth now saw had left when man was still huddled in caves; that the light now streaming from them would be seen in an unthinkable future when there might be no more men on Earth.

The *Hudson* had taken an orbit about Troas, some four thousand kilometers out. The companion, Ilium, looked almost four times as big as Luna seen from Earth; the limb was blurred by the thin atmosphere, and the harsh glare of dead sea-bottoms mottled the bluish face. A small world, old before its time, no place to colonize; but it would be a rich nearby source of minerals for men on Troas.

That planet hung enormous in the viewports, filling nearly half the sky. You could see the air about it, clouds and storms, day and night. The ice-caps covering a third of its face were blinding white, the restless tide-whipped oceans were a blueness which focused the light of one sun to a cruel point. There were islands and one major continent, its north and south ends buried under the ice, spreading easterly and westerly halfway round the planet. It was green about the equator, hazing into darker green and brown toward the poles. Lakes and rivers were like silver threads across it. A high mountain range, rugged sweep of light and shadow, ran down either coast.

The half-dozen men in the ship's observatory hung in weightless silence. The mingled light of the suns gleamed off the metal of their instruments. They were supposed to compare notes on their several observations, but for a while they didn't want to speak, this was too awesome.

"Well?" Hamilton barked it out at last. "What have you found?"

"Essentially—" Lorenzen gulped. The anti-space sickness pills helped some, but he still felt weak, he longed for weight and clean air. "Essentially,

we've confirmed what the Hercules expedition noted. Mass of the planets, distance, atmosphere, temperature—and yes, the green down there definitely has the absorption spectrum of chlorophyl."

"Any sign of life?"

"Oh, yes, quite a bit of it. Not only the plants, but animals, huge herds of them. I've got plenty of photographs." Lorenzen shook his head. "Not a trace of the *Da Gama*, though. We've looked for two of the planet's days, and we could surely have spotted their boats or an abandoned camp. But nothing."

"Could they have landed on Sister and come to grief there?" Christopher Umfanduma, the African biologist, gestured at the stark face of Ilium.

"No," said Hamilton. "Doctrine for these survey trips is that the expedition goes first to the planet it has announced it will go to. If for any reason they then go elsewhere, they leave a cairn big enough to be seen from space. We can check Sister, but my conviction is that the trouble happened on Junior. Sister is too typical, it's like Mars; nothing much *can* happen to well-trained spacemen on a place like that."

"Other planets in this system?" asked Hideki. "Maybe they—"

"No, there aren't any. Just a stinking little group of asteroids in the other Trojan position. Planetary formation theory and considerations of stability just about prohibit anything else, but I checked on the way in to make sure."

"Of course," ventured Avery, very softly, "the expedition could perhaps have left Troas in good form and perished on the way home."

Hamilton snorted. "Nothing can happen to a ship in the warp. No, it's down"—his deep-set eyes went to the planet and rested there, darkly—"on Junior that whatever happened to them, happened. But why no trace of them? The *Da Gama* herself ought still to be in orbit up here. The boats ought to be visible down there. Were they sunk into the ocean?"

"By whom?" Avery said it into a sudden enormous quiet. "Or by what?"

"There's no trace of intelligent life, I tell you," said Lorenzen wearily. "At this distance, our telescopes could spot anything from a city or an aircraft to the thatch hut of some savage."

"Maybe they don't build huts," said Avery. His face looked abstracted.

"Shut up," snapped Hamilton. "You've got no business here anyway. This is a mapping room."

Hideki shivered. "It looks cold down there," he said. "Bleak."

"It isn't," said Fernandez. "Around the equator, the climate ought to be rather like, say, Norway or Maine. And you will note that the trees and grasses go right up to the swamps at the foot of the glaciers. Glacial periods aren't anywhere near as barren as people think; Earth was full of

animal life in the Pleistocene, and it wasn't till hunting got worse when the glaciers receded that man was forced to develop agriculture and become civilized. Anyway, those glaciers are on the way out; I've seen distinct moraines in the photographs. When we settle here and jack up the carbon dioxide content of the air, you will be surprised how fast Junior will develop its own tropics. A few hundred years, perhaps. Geologically, nothing!" He snapped his fingers and grinned.

"*If* we settle it," grunted Hamilton. "Now, how long before you can have reliable maps, Lorenzen?"

"Um-m-m . . . well . . . a week, maybe. But do we have to wait that long?"

"We do. I want one overall map on a scale of one in a million, and enough others to cover the central valley region where we'll land—say from five degrees on either side of the equator—on one to ten thousand. Print up about fifty copies of each. Run your prime meridian through the north magnetic pole; you can send down a roboflyer to locate it."

Lorenzen groaned inwardly. He had the cartographic machines to help him, but it wasn't going to be fun.

"I'll take a boat and a few men and run over for a closer look at Sister," went on Hamilton. "Not that I expect to find anything much, but—" Suddenly he grinned. "You can name the conspicuous features down there anything you like, but don't be like that Chilean map-man at Epsilon Eridani III! His maps had been official for ten years before they found out every one of his names was an Araucanian obscenity!"

He clapped the astronomer's shoulder and pulled himself out of the room. *Not a bad sort,* thought Lorenzen. *He's a better psychman than Avery; though Ed isn't such a slouch either; he just lacks personality.*

He decided to stick by the classical nomenclature of the Hercules expedition. Mount Olympus, Mount Ida, the huge river down there would be the Scamander—and, of course, it wouldn't last. When the colonists came, it would be Old Baldy, Conchinjangua, Novaya Neva—

If the colonists came.

"Let's, uh, let's get organized," he said aloud, awkwardly. "How many here know anything about cartography?"

"I do," said Avery unexpectedly. "I'll help out if you wish."

"Where in cosmos did you pick that up?" asked Fernandez.

"Part of my education. A lot of applied psychodynamics consists of conformal mapping, though we generally have to use spaces of several dimensions and non-Cartesian coördinates. I can handle a mapping machine as well as you can."

Lorenzen blinked. After a moment, he nodded. The modern science of human behavior was out of his line,

but he'd seen some of the texts; they used more paramathematical symbols than his own.

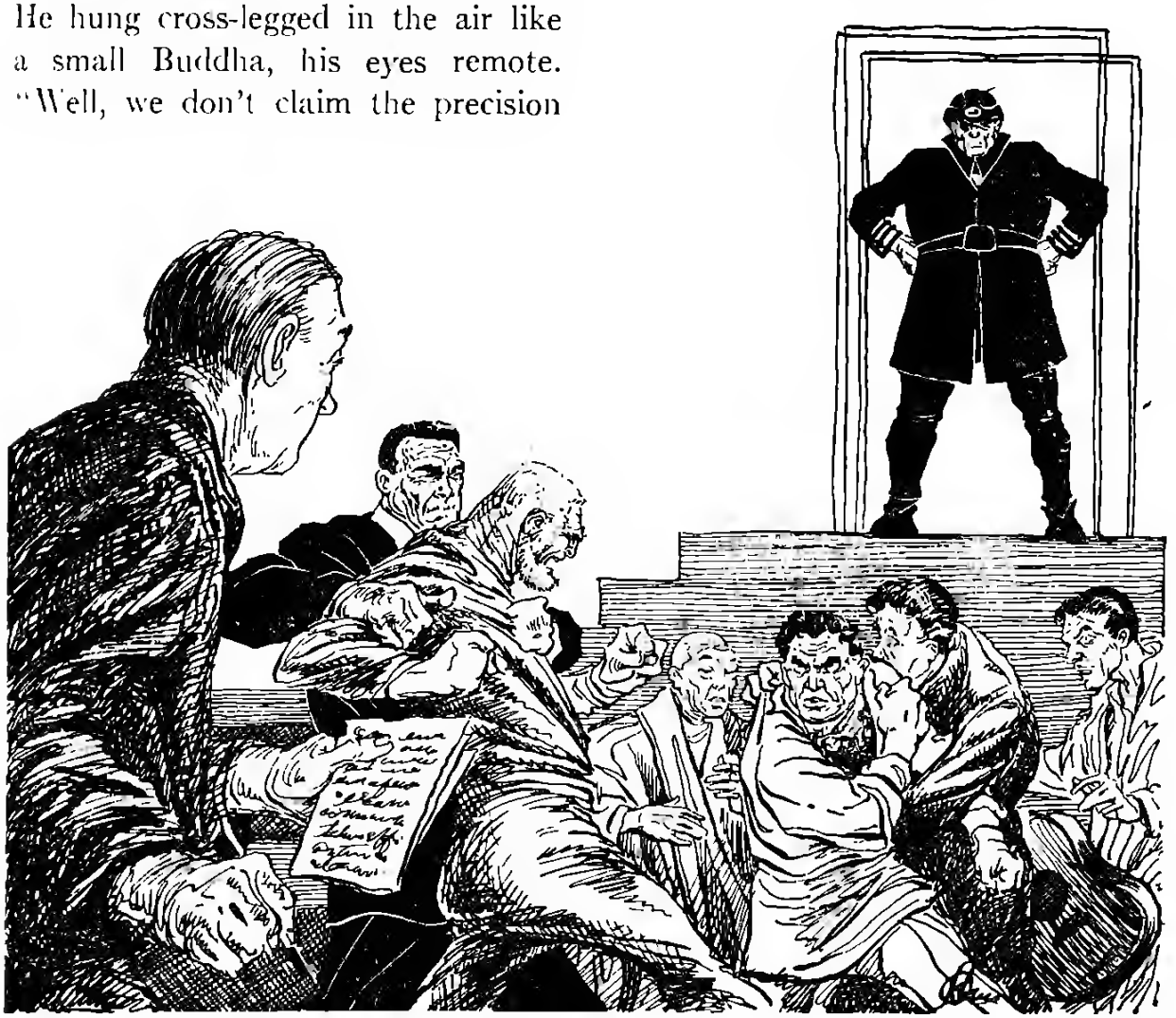
He crooked an arm around a handrung and let his legs stream out behind him. Avery had said his tendency to space sickness was mostly psychological. ("You're all knotted up inside, John. You ought to take a year off and get a series of treatments. It's free, you know.")

"How precise is your science, anyway?" he asked. "The popular articles on it are always so vague."

"Well –" Avery rubbed his chin. He hung cross-legged in the air like a small Buddha, his eyes remote. "Well, we don't claim the precision of the physical sciences," he said finally. "In fact, it's been shown rigorously that we can never achieve it: a kind of uncertainty principle of our own, due to coupling between observer and system observed. But a lot has been learned."

"Such as what?" inquired Umfanduma. "I know about the advances in neurology, that's in my own line. But how about man as . . . as man, instead of as a biophysical mechanism?"

"The amount of knowledge depends on the particular field of study," said



Avery. "Already before World War III, they were using games theory in military work, and later the big computers made it possible to analyze even complex phenomena like business from a theoretical viewpoint; that in turn led to some understanding of economics. Communications theory turned out to be widely applicable: man is, after all, essentially a symbolizing animal. The least effort axiom was useful. Gradually a mathematical and paramathematical system has been built up, in which the elements—potentials, gradients, and so on—can be equated with observable phenomena; thus it becomes possible to derive theorems. It's still hard to check the validity of many of these theorems, conditions at home are too confused even today and of course you can't very well run a controlled experiment with human beings; but in so far as we have data, they confirm the present theories. Quite often it's possible to predict large-scale things like economic cycles with high precision."

"Didn't the dictators know most of that?" asked Lorenzen. "They certainly had effective propaganda techniques. I was more interested in modern developments—"

"Most of it is modern," snorted Avery. "Very little that went before was of scientific value. To consider only the history of my own region, North America: the propagandists of capital and labor, the advertising men, worked on such a primitive level, with such a primitive appeal, that quite often they produced a reaction against themselves; some historians think that the only thing the advertising business ever really sold was the advertising business. They were only part of the mass-psychological debacle that led to military defeat. The commissars were mentally blinkered by their own outworn ideology; they never dared investigate beyond its dogma. The self-styled Liberators were only interested in getting that power for themselves; it wasn't their propaganda which won the people to them, but the commissars' tyranny, and they were soon just as unpopular. The warlords during the Interregnum did have psychomilitary analysts, yes, but the only original work then was done in Brazil. Later, in the theocratic period, research was pushed because the Mongku Empire presented a challenge and the first politicomathematical analyses were performed; but since that war was fought by bred professionals, for limited goals, the results weren't used for much till the Mongkus engineered the Sebastianist revolt in Brazil. But it wasn't till after Venus had taken over and Earth was temporarily at peace and the theocrats tossed out of America, that really thorough research was done. Then, of course, we finally got the formulated psychodynamics, the field and tensor approach, and it was used to bring on the Mars-Venus war and unify the Solar System—but the completed science had been

worked out by peaceful professors interested only in the problem itself; their type is still doing all the major new work."

"*Whew!*" laughed Umfanduma.

"Completed science, did you say?" inquired Lorenzen. "I thought—"

"Oh, yes, work is still going on, all the time. But the results are already far enough along to be of inestimable value. Control of the economic cycle, for instance; the most efficient distribution of cities; currency stabilization; the gradual weaning of man away from barbarism toward the first really mature civilization—a civilization where *everyone* is sane." Something glowed behind the pudgy face and the blinking pale eyes. "It's a heartbreakingly big job, it'll take centuries and there'll be many setbacks and failures and mistakes—but at least, for the first time in history, we have not only good intentions, but some idea of how to implement them."

"Yes, I suppose so," murmured Lorenzen. His mind continued: *You can't elect a psychocrat, any more than you can elect an engineer. I don't want an elite of any kind, the world has seen too many of them; with all its maddening drawbacks, parliamentary government is still the only way, the psychocrats must still remain only advisors.*

But one gets into the habit of letting the advisors lead—

He sighed and shoved away from the wall. "Come on," he said. "Work to do."

VI.

Lorenzen knew that an unknown planet was approached cautiously, but the knowledge had only been in the top of his head. This was the first time he lived through that scare, and it nearly drove him crazy.

When the maps were ready, four boats descended—forty men, with a skeleton crew remaining on the *Hudson* in her orbit. Fernandez sweated on the way down; it was he who had picked the landing site, and his fault if it turned out to be a morass or an earthquake region. But nothing happened.

That was exactly the trouble—nothing happened. They landed some kilometers from the Scamander, on a wide green plain dotted with clumps of trees and hazing into blue distance. Silence fell when the rockets were cut off; the grass fire they had started burned itself out; and men stared wistfully through the viewports at the sunlit world outside.

The chemists and biologists were busy. There was detailed analyses to do—of air, of soil and vegetation samples brought in by robots. Thornton checked radiation and reported nothing harmful. A cageful of rhesus monkeys was set outside and left for a week. During that week, nobody stirred from the boats. The robots which came and went were sterilized with savage thoroughness in the air locks. There was nothing for the rest of the men to do.

Lorenzen buried himself in his microbooks, but even Shakespeare and Jensen and "The Song of the Jovian Men" got wearisome. Others puttered about, quibbled with each other, yawned and slept and woke blearily to another day of nothing. There were no open quarrels on this boat, Hamilton was aboard it; but the captain often had to snap furiously over the telescreen at men in the other craft.

Fernandez came close to losing his temper once. He protested to Hamilton: "You can't be that frightened of sickness!"

"I sure can," grunted the captain. "If evolution on this planet is as close to Earth's as it seems to be, you can bet your degree there are some microbes which can live off us. And I want to go home on my feet. The least I can do is make reasonably sure we won't catch anything air-borne."

Hideki and his team reported on such plants as they had analyzed: essentially terrestroid, though denser and tougher. Some were poisonous because of heavy-metal content or the like, but most could be eaten quite safely; a man could live well on the wild vegetation alone. It would take more study, though, to determine just how many sorts you had to eat for a balanced diet.

It was quite an event when they had their first meal of Troan food. The flavors were indescribable—Lorenzen grew aware of how impoverished most human languages are with respect to taste and smell sensations—but there were hints of ginger and cinnamon and garlic. He grinned and suggested: "Perhaps the soul of Escoffier isn't in Paradise at all; maybe he was given special permission to fly around the galaxy and see what he could whomp up."

Thornton frowned, and Lorenzen flushed—but how do you apologize for a joke? He said nothing, but winced when he remembered the incident.

Hamilton only permitted half the men to eat that meal, and observed them closely during the day that followed.

Now and then animals were seen, most of them small fleeting shapes that scuttled through the long grasses on the edge of the burned area; but once a herd of bigger quadrupeds, the size of ponies, wandered past: grayish-green, scaled, with long hoofed legs and earless reptilian heads. Umfanduma cursed with his impatience to get a closer look.

"If the reptiles have developed that far," he said, "I'll give odds there are no mammals."

"Reptiles—in a glacial period?" asked Fernandez skeptically. "Not that big, my friend."

"Oh, not reptiles strictly speaking, but closer to that stage than terrestrial mammals. There are cold and warm seasons here, I'm told, so they must have warm blood and well-developed hearts; but they certainly don't look placental."

"That's another argument in favor of there being no intelligent life here," said Lorenzen. "It looks as if this planet is wide open, just waiting for man."

"Yes—just waiting." Avery spoke with a sudden surprising bitterness. "Waiting for mines and cities and roads, for the hills to be leveled and the plains filled up with people. For our dogs and cats and cows and pigs to wipe out the infinite variety of native life. For noise and dust and crowding."

"Don't you like the human race, Ed?" asked Gummus-lugil sardonically. "I thought your job required you to."

"I like the human race in its proper place—which is Earth," said Avery. "Oh, well." He shrugged and smiled. "Never mind."

"We've got a piece of work to do," said Hamilton. "It's not our department to worry about the consequences."

"A lot of men have said that throughout history," replied the psychman. "Soldiers, executioners, scientists building atomic bombs. Well—" He turned away, sighing.

Lorenzen grimaced. He remembered the green rustling stillness of the Alaskan woods, the stark wild glory of the Lunar peaks—there was little enough of that left in the Solar System, few enough places where you could be alone. It did seem a pity that Troas—

After a week, the monkeys were brought in. Umfanduma checked them carefully, killed and dissected them, ran analyses with the help of Hideki. "All normal," he reported. "I found some types of native bacteria in their bloodstream, living harmlessly and completely sterile; apparently they can't reproduce in the chemical conditions of the terrestrial body. You wouldn't even get a fever from them."

Hamilton's lean gray head nodded. "All right," he said at last, slowly. "I guess we can go out."

He led the way. There was a brief ceremony of planting the flag of the Solar Union. Lorenzen stood bareheaded with the rest, the wind ruffling his hair under an alien sky, and thought that in this big lonely landscape the whole affair was a little ridiculous.

For a couple of days the site boiled with activity as camp was set up, men and robots working around the clock. There was always light, from the green or red sun or both, or from the great shield of Sister, high in a sky that burned with an unbelievable glory of stars. The work was hampered by friction between men; it seemed strange that they should quarrel when they were as isolated as men had ever been. But it went on. A neat circle of collapsible shelters grew up around the clustered boats; the main generator began to throb and there was electric light; a well was tapped, a sterilizing unit built, and there was running water; a ring of detectors and alarms

and guns was drawn about the camp. The shelters became sleeping quarters, a messhall, a sick bay, several laboratories, a machine shop. Their metal half-cylinders looked harsh and out of place in the soft landscape.

After that, Lorenzen found himself rather a fifth wheel. There wasn't much for an astronomer to do. He set up a telescope, but between the suns and the satellite there was always too much light for effective study. In the scurrying busyness of the camp, he began to feel homesick.

He went in their one aircar with some others to the Scamander, to take a closer look and gather specimens. The river was enormous, a slowly rolling brown sheet; when you stood on one reedy bank, you couldn't see the other. The fish, insects, and plants didn't interest him much; as a zoological layman, he was more for the larger animals, paraphylon and astymax and tetrapterus. Hunting was easy, none of them seemed to have known anything like man and a rifle bowled them over as they approached curiously closer. Everbody wore a sidearm, for there were carnivores; you could hear them howling at night—but there was really nothing to fear from them.

There were no tall trees; the low scrubby growths which dotted the plains were incredibly tough, an ax would hardly dent them and you needed an AH torch to cut them down. The biological team reported them—on the basis of dendrochronology—to be some centuries old, they grew slowly. They wouldn't be of much use to man, he'd have to bring his own seedlings and use forced-growth techniques if he wanted lumber. But the catalogue of edible plants and animals grew apace. A man could be set down here naked and alone, and if he knew anything at all about flint-working he could soon be comfortable.

Then what had happened to the men of the *Da Gama?*

It could not have been Junior's own environment. It wasn't that alien; as far as wild beasts and disease went, it looked safer than some parts of Earth even today. Now in the warm season, the days were bright and the rains were merely cool; there would be snow in winter, but nothing that fire and furs couldn't stand off. The low carbon dioxide content of the air required a slight change in breathing habits, but it was easily, almost unconsciously made. The lighting was weird—sometimes greenish, sometimes reddish, sometimes a blend of both, with double shadows and the colors of the landscape shifting with the suns—but it was not unpleasing, surely nothing to cause madness. There were poisonous plants, a couple of men got a bad rash from merely brushing one herb, but anyone with half a brain could soon learn to avoid those types. The land was quiet, speaking only with a sough of wind and rush of rain and thunder, remote cry of ani-

mals and beat of wings in the sky—but that, too, was only a relief after the clangor of civilization.

Well—

Lorenzen puttered with his instruments, measuring the exact periods of revolution and rotation for the planet and the heavenly bodies. The rest of the time he helped out, awkwardly, where he could, or talked to men off duty, or played games, or sat around and read. It wasn't his fault, this idleness, but he felt obscurely guilty about it. Maybe he should consult Avery. The psychman seemed rather a lost soul himself.

Twelve of Junior's thirty-six hour days slipped past, and then the aliens came.

VII.

A telescope swinging on its clockwork mounting. Sudden shapes moving in its field. A photocell reacts, and the feedback circuit holds the 'scope leveled on the approaching objects. As they come nearer, an alarm is tripped and a siren skirls into the quiet air.

Friedrich von Osten jumped from the cot on which he had been dozing. "*Lieber Gott!*" He grabbed a rifle, and loosened the magnum pistol at his waist as he ran from the tent. Other men were sticking their heads out of the shelters, looking up from their work, hurrying to their posts at the machine gun emplacements.

Von Osten reached the command post and poised on the edge of its trench, raising his field glasses. There were . . . yes . . . eight of them, walking steadily toward the camp. It was too far yet to see details, but sunlight flashed hard off metal.

He picked up the intercom mike and said harshly: "Stand by all defense stations. Iss Captain Hamilton dere?"

"Speaking. I'm up in the bow of Boat One. They look . . . intelligent . . . don't they?"

"*Ja*, I t'ink dey are."

"All right. Stand by. Keep them covered, but don't shoot till I say so. That's an order. No matter what happens, don't shoot till I tell you to."

"Efen if dey open up on us?"

"Yes."

The siren rose to a new note. Alarm stations! General alert!

Lorenzen ran for the shack assigned to him. The camp was a scurrying confusion, shouts and thud of feet, dust swirling up to dull the drawn guns. The aircar shot overhead, rising for a bird's-eye look. *Or tetrapterus eye?* thought Lorenzen wildly. *There are no birds here. This isn't our world.*

He entered the shelter. It was crowded with a dozen men, untrained in militechnics and assigned here mostly to keep them out of the way. Avery's round face gaped at him; the light of Lagrange I, streaming in the window, looked ghastly on his skin. "Natives?" he asked.

"I . . . suppose so." Lorenzen bit his lip. "Seems to be half a dozen or so, coming on foot. What are we s-s-scared of?"

Thornton's long gaunt face thrust out of a shadowed corner. "There is no point in taking chances," he said. "No telling what those . . . things . . . intend, or what powers they command. 'Be ye therefore wise as serpents—'"

"' . . . And harmless as doves,'" finished Avery. "But are we?" He shook his head. "Man is still adolescent. And this reaction is . . . childish. Fear of the unknown. With all the energies we have to use, we're still afraid. It's wrong."

"The *Da Gama*," said Thornton tightly, "did not come back."

"I don't think . . . simple planet-bound natives, without so much as a city, could have been . . . responsible," said Avery.

"*Something* was," said Lorenzen. He felt cold. "They might have weapons—b-b-bacteriological—"

"It's childish, I tell you, this fear." Avery's voice wobbled. "We've all got to die sometime. We should greet them openly and—"

"And talk to them, I suppose?" Thornton grinned. "How good is your Lagrangian, Avery?"

There was silence. The noise outside had died away, now the whole camp lay waiting.

Lorenzen looked at the chronom on his wrist. It swept out the minutes, one, two, three, ten, thirty, and time was hideously stretched. It was hot in the cabin, hot and dusty. He felt sweat trickle down under his clothes.

Forever went by in an hour. And then the siren blew. *All clear . . . come out . . . but stay alert.*

Lorenzen almost bolted from the shelter. He was close enough to the point where the aliens were to get there ahead of the crowd.

A semicircle of men, rifles in the crook of their arms, faced the strangers and held back the approaching humans. Hamilton stood in front of the guard, stiff and massive, watching the newcomers out of expressionless eyes. They looked back at him, and there was no reading their faces.

Lorenzen took them in at one gulping glance, and then went back for details. He had seen films of extra-terrestrials before, and these were not as unearthly as some that had already been found—but still, it was a shock to see them here in the flesh. It was the first time he truly, fully realized that man was not unique, not anything special in the immensity of creation.

They stood on their hind legs like men, though with a forward slant which reduced their potential one and three fourths-meter height by a good ten centimeters; a heavy kangaroolike tail balanced the body, and was probably a wicked weapon for infighting. The arms were rather skinny, other-

wise humanoid, but the hands had three fingers and two opposed thumbs; each finger had an extra joint, and ended in sharp blue nails. The heads were round, with tufted ears, flat black noses, pointed chins, whiskers above the wide black-lipped mouths and the long golden eyes. They seemed to be mammals—at least, they were covered with smooth gray fur, barred in darker color that formed a mask about the eyes. Their sex was probably male, though Lorenzen couldn't be sure from their clothing: loose blouses and baggy pants apparently woven of vegetable fiber, and a kind of mukluk on the feet. They all had leather belts supporting a couple of pouches, a knife or hatchet, and what was presumably a powder horn; on their backs were small packsacks, in their hands long-barreled affairs which he took to be muzzle-loading smoothbores.

In the first moment, they all looked alike to him; then he forced himself to locate individual differences of size, build, face: they varied as much as humans.

One of them spoke, a throaty purr. When his mouth was open, you could see the long blue canine teeth, though otherwise they seemed dentally as unspecialized as man.

Hamilton turned around. "They don't act like a war party," he said. His voice and the low murmur of wind were the only sounds. "But you can't ever tell—Avery, you're a linguist. Can you make anything out of their talk?"

"Not . . . yet." The psychman's face was shiny with sweat, and his voice jittered. Lorenzen wondered why he should be that excited. "They do have distinct words."

"Hell," grunted Gummus-lugil, "I can't even hear that. It all sounds alike to me."

Another of the strangers spoke. Straining, Lorenzen could make out the pauses between phoneme groups. He'd taken a course in comparative linguistics at college, but it was vague in his mind now.

"They act like . . . well, I don't know what," said Hamilton. "Except that we're obviously not great gods from the sky to them."

"Wouldn't expect that." Avery shook his head. "If they've progressed as far as gunpowder hand weapons, I imagine their society is pretty sophisticated. Those muskets look better than what they had on Earth in Newton's time."

"But where are they *from?*" cried Fernandez. "There are no cities, no roads, not even so much as a village —I doubt if there is a house on this planet!"

Hamilton shrugged. "That's what I hope we can find out." His voice grew crisp: "Avery, you work on their language, that's your line. Von Osten, maintain guards at the defense posts, and detail a man to accompany each of these creatures wherever he

goes within the bounds of the camp. But no rough stuff unless they try something extremely suspicious, and no holding them here if they want to leave. The rest of you carry on as before, but keep your arms ready all the time and don't leave camp without checking with me first."

It was sensible, thought Lorenzen. The strangers didn't look formidable, but you never knew, you never knew.

Slowly, the group broke up. The aliens followed Avery docilely enough, and one by one the others quit staring after them. Lorenzen heard Fernandez's murmur: "Natives after all! And pretty highly developed, too."

"Yeh." There was an odd sag to Gummis-lugil's heavy shoulders. "It looks like this pretty well kills the idea of colonizing."

Which may be the death-blow to all man's dreams about the stars.

Lorenzen tagged along after Avery. "Can I help you, Ed?" he asked.

"You're not a linguist, John," said the psychman. "I'm afraid you'd only be in the way."

Lorenzen felt a stinging sense of rebuff. He gulped and persisted: "You'll need help. Somebody to act out the verbs, and—"

Avery considered for what seemed a curiously long time. "All right," he said at last. "To start with, anyway."

VIII.

The aliens were offered a bunkhouse and moved into it with alacrity; another was set up for the displaced humans. They were shown through the camp and the boats, but there was no telling what they thought about it. Men noticed that they always had somebody on watch while they slept. They didn't seem to like messing with the humans, and used their own utensils to cook native food given them. But they stayed around for days, and worked hard with Avery and Lorenzen.

It seemed they called themselves Rorvan, as nearly as a human throat could form the word. Individual names emerged for them: Silish, Yanvusarran, Alasvu—Pointing to objects and acting out verbs began to give an elementary vocabulary and the whole stock of phonemes: it was a flexible tongue, they had almost fifty. Tonal qualities seemed to be important, but in analyzing his data Avery said the language was not analogous to Chinese. "I'm pretty sure it's inflected," he declared, "but I can't make head or tail out of the grammar. Possibly the tones form the inflections, but—" He sighed.

"Why not teach them English or Spanish?" inquired Lorenzen.

"I don't want to scare them off by the prospect of so much hard work. They may be just a group of wanderers who chanced on us and will decide any moment to take off again. Don't forget, they could be anything from official ambassadors to hobos or

bandits, or something for which we have no word. We know nothing about the structure of their society or about them personally." Avery ran a hand through his thin hair and looked at the notes he had. "Their language just doesn't make sense!"

"Let me study your data for a while," offered Lorenzen. "I know a little something about glossanalysis."

"Not just yet, John. I want to go over it myself a few more times. I'll run off a copy for you soon."

The next day Lorenzen was asked to go in the aircar to help in a specimen-collecting expedition. He could not very well refuse, though he fumed at the delay. When he came back, Avery gave him a sheaf of papers and a wry grin.

"Here you are," he said. "I got a lot of information yesterday while you were off, but it leaves me in a worse mess than before. A lot of it contradicts what I thought I knew."

Lorenzen spent hours over the copy and had to confess himself beaten. The word for too many important things, or the meaning of a given sound, varied without discoverable rhyme or reason. Sister, for instance, was referred to as Ortu, Omanyi, Valakesh, Arbvu-djangiz, Zulei, and a whistling noise answering to nothing in any human tongue; and it looked as if each of these words took on an entirely different meaning in other sentences. It didn't seem merely a question of synonymy: you wouldn't expect the Rorvan to be so stupid as to confuse the issue thus. The name seemed to depend on the context in some obscure manner. The whole mass of conversation held nothing identifiable as a statement.

He gave up, realizing with discouragement that he was doubtless only underfoot. Avery continued working doggedly, sitting up late to ponder each day's material. But he was the only one who didn't feel a darkness of futility.

"What are we staying here for, anyway?" demanded Gummus-lugil. "There are natives. They seem to be in a position to make colonization impossible. Why not just go home and get drunk and forget the whole mucking place?"

"We're supposed to complete the survey," said Lorenzen mildly.

Gummus-lugil took out a foul old pipe and began to stuff it. His heavy dark face twisted into a scowl. "Survey my eye! You know as well as I do this is a practical expedition. We're wasting time we ought to be using to find a planet we can have."

Lorenzen sighed. "I wonder if we ever will. It was tough enough to finance this trip. D'you think anybody can raise the cash for another? There's too much to do right at home for Parliament to spend more of the public funds on what's beginning to look like a wild goose chase, and individuals with money to donate are

getting few and far between."

"Don't you care?" asked the Turk.

"Oh . . . yes. I suppose so. But I never intended to leave Sol permanently." With sudden understanding: "This means a lot to you, though, doesn't it, Kemal?"

The engineer nodded. "It does. It did. I'm getting to an age where I want to settle down somewhere and raise a family. Only what can a man do in the System? Work for somebody else, all his life. I want to be my own boss. I thought . . . oh, hell." His voice trailed off and he stared emptily across the plain.

"There is a bit of hope yet," said Lorenzen. "It may be that the natives live underground or some such thing. That they won't care if we colonize the surface. They'd stand to benefit, even, if that's the case—trade and so on."

"It could be." There was a brief flicker in Gummus-lugil's eyes, and then a hardness grew in him. One hairy hand doubled into a fist. "But *something* happened to the first expedition! I suspect the natives murdered them and buried the traces—"

"I doubt it," said Lorenzen, though a thin little fear rose in his breast. "How'd they have gotten at the ship in her orbit? How'd the personnel get so careless as to let it happen at all? No, I still think space got them somehow. A chance meteor, just at the wrong moment, or—"

"Things like that don't happen to spaceships any more."

"They could, if all the improbabilities worked out just right. Or look—you say there was an attempt to sabotage the *Hudson?*"

"Yeh. Wait a minute . . . d'you mean—"

"I don't mean anything, Kemal. But there are groups at home which

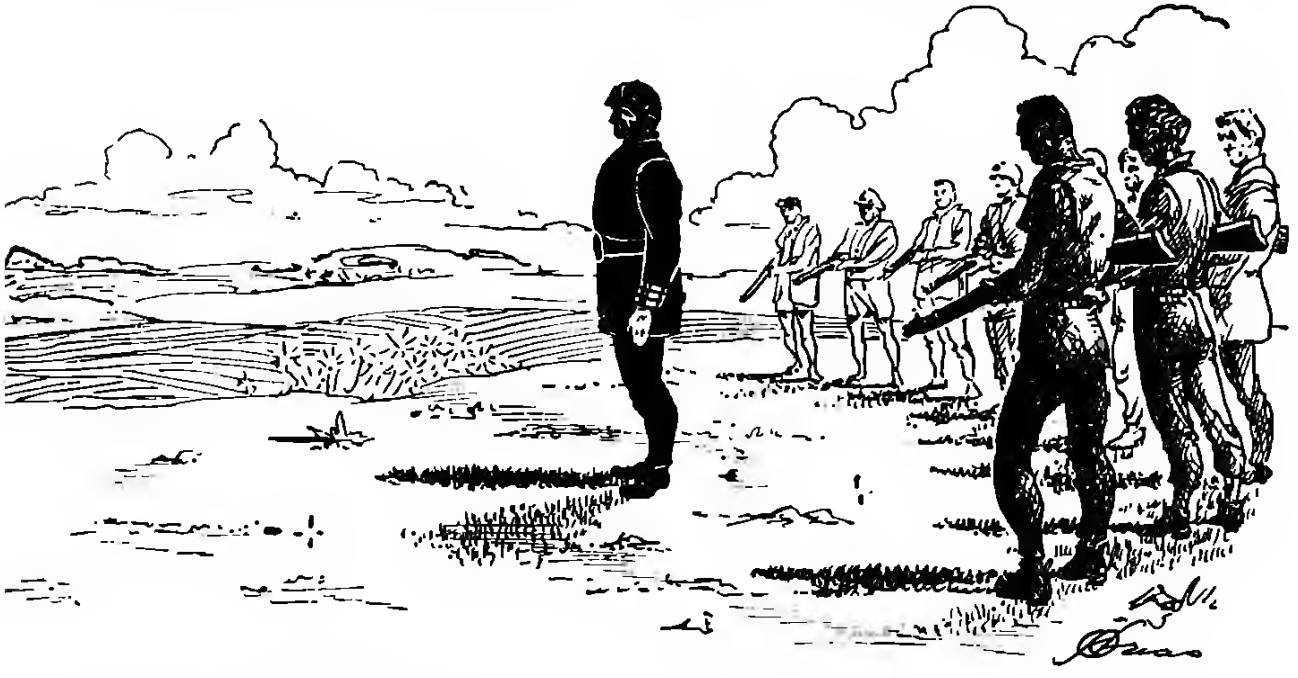
are opposed to the whole colony idea. The Resurrectionists think it's against the will of God. The Monarchists, the Collectivists, and the Eugenicists are all fanatics and all know that even their infinitesimal chance of getting into power will be gone if men start moving out of the System. Then there's Hilton's group, with its vague fear of the whole notion, pseudoscientific ideas about extraterrestrial diseases or invasion or the colonists mutating into something different and hostile—you see?"

"A bomb planted in the *Da Gama*." Gummus-lugil rubbed his chin. "It wouldn't have been too hard; she wasn't built from the keel up like ours. Of course, it's hard to see how our converter could have been monkeyed with. All our workers, right down to the last electrician, were screened by the government with just that sabotage idea in mind. But it could be. It could be."

"In that case—" A small exultance rose in Lorenzen. "In that case, we have nothing to fear."

"But they have plenty to fear from me!" The Turk's hand dropped to his gun.

Another day went by. The blue-green sun rose, mists swirled and dew flashed and then the grasses lay with a metallic sheen. Six hours later the red sun followed, and full day blazed. Clouds were tinted red or green, the double shadows had their color, the vegetation shimmered in shifting hues as wind ruffled it. The first sunset was not so spectacular, with Lagrange II still high in the sky, but the late afternoon had an eerie quality when the only light was its fiery glow. Paradox: it grew cool, even a little chilly, when only the smaller sun was up, but the unearthly red radiance suggested a furnace. The second sunset



was usually a gorgeous bursting of crimson and orange and gold. Then it was night, with a glittering glory of stars. Sister came up, red on one limb and blue-green on the other, the center a dimness of shadow vaguely lit by reflection from Junior. On the horizon, she looked enormous, seeming to fill half the sky; when well up, she was still so big that men used to Luna could not get rid of an uneasy notion that she was falling on them. Her light was a weird white rush of argence, flimmering off dew and hoarfrost. The night was big and still and strange to man.

It caught at Lorenzen. He walked alone in the chill quiet, thinking his own thoughts, and felt the challenge of the sky and the world about him. Maybe he would want to come here after all. A new planet would be wide open for any man; he could have his own observatory on a space station, try out his own ideas, look at his own land and realize it was his and his children's.

But the natives—His spirits sagged again.

Another day and another.

Lorenzen was sitting under his usual tree with his usual book when he heard his name called. He looked up, and the camp's loudspeaker rolled and boomed with Hamilton's voice: ". . . Report to the captain's office." He got up, wondering, and made his way back inside the circle of guns.

Hamilton sat at a desk in one of the huts. Avery stood beside him, looking nervous. Thornton, Fernandez, Gummus-lugil, and von Osten were already there, waiting.

"All here," said the captain quietly. "You may pass on your report, Mr. Avery."

The psychman cleared his throat. "I've made a little headway with the Rorvan language," he said. He spoke so low that it was hard to hear him. "Not much—I still don't understand the grammar or whatever it is they have, and any ideas above an elementary level just don't get across. But we can talk about very simple things. Today they said they want to go home. I couldn't follow their reason, though I imagine they want to report their findings."

"All of them going?" asked Thornton.

"Yes. I offered to have them flown home, but they refused. Why, I don't know. They couldn't have misunderstood me, I *think*. I took them to the aircar and made gestures. But maybe they don't trust us that much. They insist on going on foot."

"Where is their home?" inquired Lorenzen.

"Somewhere to the west, in the mountains. That's all I was able to gather. About a four-week hike, I'd say."

"Vell?" snapped von Osten. "Vot iss vit' us to do?"

"The Rorvan," said Avery slowly,

"were quite unhappy at the thought of our following them by air. I don't know why—it could be a taboo of some sort, or more probably they just don't trust us not to throw bombs down on their home. We're as much an unknown quantity to them as they to us, remember. If we tried to follow, I rather imagine they'd just disappear in the mountains and we might never re-establish contact. However"—he leaned forward—"there didn't seem to be any objection to some of us accompanying them on foot. In fact, they seemed anxious that we do so."

"Valking right into a trap? *Ich danke!*" Von Osten shook his head till the blond beard swirled.

"Don't be more of an ass than you can help," said Gummus-lugil. "They'd know the rest of our party could take revenge."

"Could dey, now?" Von Osten flushed and held himself in check with an effort. "How vould de oders know vere ve vere?"

"Radio, of course," said Hamilton impatiently. "You'd take a portable transceiver along—"

"But do de aliens know ve haff radio?"

"That's a good point," admitted the captain. "The chances are they've never heard of the phenomenon. And I don't think they should be told about it either—not till we can trust them more."

He made a bridge of his fingers. "Mr. Avery wants to go along with them, and I agree that we should send some men. It may well be our only chance to get in touch with the native government, or whatever it is they have. To say nothing of getting a closer look at their technology and all the rest of it. After all, they may not object to humans coming here to settle. We just don't know yet, and it's our job to find out.

"You gentlemen here aren't needed for the studies we're making, your essential work has been done and you seem logical choices for the contact party. You'll keep in touch with the camp by radio and, of course, make observations as you go along. I won't hide the possible dangers from you. There may be diseases, poisonous snakes, or anything else you can imagine.

"And the Rorvan, not knowing that I'll know exactly where you are, may indeed murder you. But all in all, I think it's fairly safe for you to go. It's strictly volunteer, of course, and no shame to the man who doesn't wish to stick his neck out—but are you willing?"

Lorenzen wasn't sure. He admitted to himself he was frightened, just a little, and would rather stay in camp. But what the hell—everybody else was agreeing. "Sure," he said.

Afterward it occurred to him that the fear of being the only hold-back might have prompted all the others, too. Man was a funny animal.

IX.

The first three or four days were not pleasure—they were pure anguish. Then muscles got used to it, and they were logging off some forty kilometers a day without undue strain. It got monotonous, just walking over a prairie that always receded into far distances. Rain didn't stop them, the humans slipped on their waterproof coveralls and the Rorvan didn't seem to mind. There were broad rivers, but all of them shallow enough to ford, and canteens could be filled there. The long-range terrestrial rifles knocked down the plentiful game at distances of a kilometer or two, and on days when no animals appeared there was always plenty of wild vegetation, stems and leaves and beans which were nourishing if tough. Gummus-lugil, who carried the transceiver, signalled back to camp every evening—a dot-dash system, to keep the Rorvan from suspecting what the radio was; Hamilton had established three triangulation robostations which kept him informed of the party's whereabouts. His own reports held nothing exciting, merely further details on what they already knew.

The Rorvan used compasses and maps to guide them, the latter in a symbology easy enough to translate once you knew what the various features were; they were hand-drawn, though that didn't mean the aliens didn't know about printing, and had a delicate touch—almost Chinese. The Mercator projection with its grid of lines and what was probably the prime meridian going straight through the south magnetic pole, suggested that they knew the true shape of the planet.

Lorenzen grew aware of the personality differences between them. Alasvu was quick-moving, impetuous, given to chattering away; Silish was the slow and stodgy type; Yanvusarran gave an impression of short temper; Djugaz seemed the most intellectual, and worked hardest with Avery. Lorenzen tried to follow the language lessons, without much success: they had progressed beyond the elementary level where he could have caught on, though Avery said communication was still a baffling problem.

"You should teach me what you already know, Ed," urged the astronomer. "Suppose something happened to you—where'd the rest of us be?"

"At worst, you could signal the aircar to come pick you up," said Avery.

"But dammit, I'm interested!"

"O.K., O.K., I'll make up a vocabulary of the words I'm fairly certain of—but it won't help you much."

It didn't. All right, so you knew the names for grass, tree, star, run, walk, shoot, where did you go from there? Avery used to sit by the campfire at night, talking and talking with Djugaz; the ruddy light burned off his

face and gleamed in the unhuman eyes of the alien, their voices rose and fell in a purr and a rumble and a whistle, their hands moved in gestures —none of it made sense to Lorenzen.

Fernandez had brought his guitar along—inevitably, groaned Gummus-lugil—and liked to play and sing in the evenings. Alasvu produced a small four-stringed harp with a resonating board that gave its notes a shivery effect, and joined him. It was comical to hear them together, Alasvu butchering "*La Cucaracha,*" or Fernandez trying to chord on the Rorvan scale. Gummus-lugil had a chessboard, and before long Silish had caught on and was giving him some competition. It was a peaceful, friendly sort of trip.

But the dark sense of its futility dogged Lorenzen. Sometimes he wished he had never come with the *Hudson,* wished he were back on Luna puttering with his instruments and photographic plates—all right, here was a new race, a different civilization, but what did it mean to man?

"We don't need more xenological data," he said to Thornton. "We need a planet."

The Martian raised his eyebrows. "Do you really think emigration will solve the population problem?" he asked. "You can't get rid of more than a few million people that way. Say a hundred million in the course of fifty years of continuous shuttle service—which somebody will have to finance, remember. New births will fill up the vacuum faster than that."

"I know," said Lorenzen. "I've been through all the arguments before. It's something more—something psychological. Just the knowledge that there is a frontier, that a man with his back to the wall can still go make a fresh start, that any commoner has the chance to become his own boss—that'll make an enormous difference to Sol, too. It'll relieve a lot of unhealthy social pressures—change the whole attitude of man, turn it outward."

"I wonder. Don't forget, some of the most ferocious wars in history were fought while the Americas were being opened and again when the planets were being settled."

"Then isn't now. Mankind is sick of war. But he needs to find something new, something bigger than himself."

"He needs to find God," said Thornton with a certain stiffness. "The last two centuries show how the Lord chastises a people who forget him. They won't escape by going to the stars."

Lorenzen's face felt warm.

"I don't see why your kind is always embarrassed when I speak of religion," said Thornton. "I'm perfectly willing to discuss it on a reasonable basis, like any other subject."

"We'd never agree," mumbled Lorenzen. "Waste of time."

"You mean you would never listen. Well"—Thornton shrugged—"I've no

great faith in all these colonization schemes, but it will be interesting to see what happens."

"I suppose . . . I suppose whatever comes, y-y-your Martian homes will be spared!" blurted Lorenzen.

"No. Not necessarily. The Lord may see fit to punish us, too. But we'll live. We're a survivor type."

Lorenzen had to admit he was right there. Whether you agreed with the Dissenters or not, it was undeniable that they had worked and fought like heroes for their particular dream. It was they who had seized control of the gaunt barren worn-out planet to which they had fled and made it blossom; it was their psalm-chanting armored battallions which had broken the Mongku Empire and fought Venus to a standstill. There was a vitality to the believer type which had shaken history. It was too bad that the reasonable man didn't share that devotion. But then, he wouldn't be reasonable if he did—

He looked at the loping gray forms of the Rorvan. What dreams lay in those unhuman skulls? For what would they be willing to slave and kill and cheat and die?

Their planet?

TO BE CONCLUDED

IN TIMES TO COME

We've got a symbolic cover coming up next month—by Alejandro. Simple thing—a blueprint and a man. But it does, I think, express a problem that's most exceedingly important in our high-order technical civilization. The tendency to want to make the versatile and labor-saving machine do everything for us must, somewhere, have a limit. I think Alejandro's done a very precise job of painting the limit on that development.

And Randall Garrett's story, "The Hunting Lodge" is quite appropriate to the cover—though there's no connection. The Hunting Lodge in this story is a bit different from the usual interpretation. It reminds me of Hamlet's speech on Polonius' death. To misquote, "Not where he hunts, but where he is hunted."

They say that a true friend is "faithful unto death"; a quasi-intelligent machine, however, has a somewhat more indescribable sort of faithfulness. It doesn't understand what death is . . . which can be rather desperately dangerous!

THE EDITOR.

LONE BANDIT

If a man acts like a small boy's dream of a super-bandit—who'd make the best detective to find him?

BY DENNIS WIEGAND

Illustrated by van Dongen

"Damn," said Edwin H. Huntley of 2376 Crestwood Boulevard. "Damn."

His copy of the Bay City *Trumpet* fluttered wildly in the air for a moment, like chickens in combat, and settled in a limp, irregular pyramid in the middle of his living room.

"What's the matter, darling?" asked his wife, promptly rising from her chair to go mix him a drink. "More Communists?"

"Wish he was one," complained Edwin H. Huntley. "No wonder they call that rag *The Strumpet*."

"Who, dear?"

"The Lone Bandit," said Mr. Huntley. "I wish he was a Communist. Then maybe that confounded newspaper would print some facts about him. The guy took a branch of the Bay City Trust for over seventy thousand bucks this afternoon. The story on it is practically invisible."

"It does seem strange," she said, glancing at her husband to gauge how much Scotch would be needed to restore his normal pallor.

"Maybe I ought to buy that paper," speculated Mr. Huntley. "Give them a change of stories maybe every two weeks. Change heroes. Change villains. Might be a money-maker."

"Drink this," said Mrs. Huntley. "You'll feel better."

"Haven't we always played ball with you before?" pleaded Ellery Dupont, Managing Editor of the Bay City *Trumpet*. "Those Japanese incendiary balloons during the war? The nice editorials all the time."

"Keep right on playing," Morton Brower advised him. "This one is out of the bush league. Might be the opening of the World Series, for all I know."

"You guys are getting too big for your britches," complained Ellery Dupont. "And I'm one of the guys who helped you get that way. Haven't you ever heard of freedom of the press?"

The agent-in-charge of the Bay City office of the Federal Bureau of Investigation made a brushing gesture, as if the air over his desk were dancing with gnats.

"You were in college, I should judge, Mr. Dupont," said Morton Brower, "along about 1932. Ever join anything—besides the Men's Glee Club?"

Ellery Dupont flushed. Then he winced, as if he had bitten his tongue.

"Thought so," said Brower. "Everybody did. Now why don't you go away back in the outfield and continue to play ball? I'll let you know when something's coming your way."

"This Lone Bandit is the biggest story this town ever saw," said Ellery Dupont, petulantly slapping his hat over his thinning hair. "I can't see why you're covering up for him. The Federal Deposit Insurance Corporation doesn't care what weapons are used to heist its dough."

"Maybe the Defense Department does, though," said Brower.

"Oh," said Dupont.

"Now please go away," said Brower, already regretting the hint. "I only work here. And I have work to do. Your old man owns that paper. It makes quite a lot of difference in the working conditions."

Detective lieutenant Max Condorski glowered at his psychiatrist from under the brim of his hat. He was already reaching for the door knob.

"In seven years, maybe, I can go to Florida," he said. "In seven years I can go to Florida and stay there."

"I can't be responsible," said Dr. Orlo Tappen King. "Your condition is quite evidently too far advanced. You must make your choice."

"Look," said Condorski. "You still don't get the picture. I did see everything I told you I saw. That's not what bothers me. It's that leadership angle. I got that guilt-feeling bad. Real bad."

"The habit of command quite effectively counterbalances that feeling in the normal mind," the psychiatrist said. "You obviously don't feel guilty about having ordered those men to their death. You must realize that you are suffering hallucinations resulting from some deep-seated subconscious conflict."

"No wonder you guys draw most of your trade from women," sighed Condorski. "I just wish I could show you. But those FBI men—"

"Really, lieutenant," said the psychiatrist, half-rising from his desk chair. "If you are not prepared to respect my profession, there is nothing whatever that I can do for you."

"No pills?" Condorski almost pleaded. "Maybe an injection? Something that'd give me the old snap and bark. Just till this thing blows over—or something . . ."

"Most certainly not," snapped the psychiatrist. "First of all you need rest and quiet and a change of scene. Then, perhaps, I can—"

"You're telling me?" said the policeman. He jerked the door open, stepping aside as he did so. Apparently satisfied that no shots were going to come through the open door, he went out through it, slamming it behind him.

"A policeman's lot is not a happy one," said Dr. Orlo Tappen King to himself, smiling slightly.

Mrs. Colton Williams came back into the darkened bedroom. She had been a trained nurse before she had married a rising young bank clerk on the rebound from an interne.

"Lie still now a minute, dear," she said briskly, but soothingly. It was a tone of voice she'd forgotten she had. "Here's a nice fresh ice bag."

"I didn't realize," he groaned. "I told you it looked just like that fool toy we gave Bertie on his birthday two years ago. I told you that, didn't I? I didn't realize."

"Hush now," she said. "That FBI man is still downstairs. There's noth-

ing to worry about now."

"I wouldn't have made a move," babbled Colton Williams. "As manager of the bank I'm responsible. I am responsible and I feel responsible—for both Barter and Miss Jankowski."

"Now, Colton," she said, "they've all told you that it wasn't your doing. Mr. Collins, the police . . . just everybody says so. And, after all, it's what Mr. Collins says that counts."

"I'll never go back to the bank anyhow," moaned Williams. "I couldn't. I couldn't face them. I thought he was one of these cranks or crackpots. Come in with a vial of milk and a note saying it's TNT. Grandmothers with cap pistols."

"I know, dear," she said. "That's just it."

"A disintegrator-ray gun," said Williams, brushing the ice bag to the floor. "Just like Bertie's. Just exactly like Bertie's. Who'd ever imagine it was real? It took a big hunk out of the bank. Barter gone . . . all the way down to the knees. Miss Jankowski and her desk. Gone. Completely gone. An empty desk behind hers. And the wall. The wall right through to the Supermarket's meat counter."

"Do try to get some rest, Colton," she said in her impersonal nurse's voice. "The FBI man is right downstairs. Nothing can happen."

"It isn't me," said Williams, clutching the corner of his pillow. "It isn't me. It's everybody. The others. You don't understand."

"Bay City," mused the general. "Wonderful place. Commanded out there for three years once."

"Come, come, general," said the secretary. "Reminiscences aside . . . any ideas?"

"It doesn't seem possible," said the general.

"I'll bet you said the same thing to Billy Mitchell when you and he were shavetails together back at old Fort Sam," said the secretary.

"Never served with Mitchell," denied the general.

The secretary quirked his lips back in a thin smile. "There's no doubt about it," he said. "I mean about the Lone Bandit with the disintegrator-ray gun. There are atomic bombs and hydrogen bombs . . . so why not disintegrator-ray guns elsewhere than under the Christmas Tree?"

"Anyway," said the general, "Congress wouldn't let us buy any of them."

"What I want to know, general, and right now," said the secretary with asperity, "is: did you make the check I asked you to make?"

"Yes," said the general, unconsciously drawing himself to attention. "Not a shred of such a thing on any drafting board anywhere. Not even any crackpot inventors turned away with anything like a disintegrator-ray gun."

"I wish I could offer him an am-

nesty," said the secretary, almost wistfully. "Even for the murders. But we're trapped. We can't even make such an offer, if that were possible, without breaking the radio and newspaper silence. And we can't break the silence without creating a panic."

"I don't know," said the general. "Seems to me the people can get used to anything nowadays. Jet planes. Atom bombs. Why not disintegrator-ray guns?"

"Too personal," objected the secretary. "Much too personal."

"I don't like the idea myself," admitted the general.

"Hysteria, that's what I say it is," said the bald-headed man, stirring his coffee with nervous impatience. "They'll believe anything is possible. There's as much unquestioning faith in science today as there ever was in God."

"I don't know," said the man with the mat of silvery-gray hair. "There're at least twenty of us working on this search."

"The Army," explained the bald-headed man. "Weren't you ever in the Army? Any of us could have told them it would be a waste of time—and without going within a mile of the Patent Office."

"Sure," said the gray-haired one. "What I recommended to the FBI was that they circularize every Patent Attorney in the country, asking about crackpots with ideas for disintegrator-ray weapons. That's where they might run into something. But nobody'd be fool enough to try to file an actual application."

"You can't tell the FBI," sighed the bald-headed man. "Those birds see too many movies."

"Maybe somebody actually did invent a practical disintegrator-ray weapon, though," said the gray-haired man. "Where there's smoke, there's fire."

"Are you kidding? Why would they have to try to find him? He'd be parked right now in the anteroom of some general, with a bundle of empty sacks for hauling away the boodle. Probably that's where he is right now. Still waiting."

"He'd try to get a patent first," said the gray-haired man.

"Nuts," said the bald-headed man. "You should know as well as I do that a patent is just a license to sue and be sued. The best way to collect on a gadget like that would be to use it to stick up banks. That way you'd be sure of a pay-off for your time and trouble."

"Yeah," laughed the gray-haired man, "and the thing would be handy for removing the doors of the vaults."

"Let's go back and waste some more time at government expense," suggested the bald-headed man, lifting his plate to slip a quarter under it.

"So I've put in nearly twenty years on the force," said the man in grease-

smeared overalls. "So what? What good is a pension when you're six feet under?"

"Look, Bill," said the garage foreman, "quit squawkin' before you're hurt. They ain't said anything yet about putting the garage detail back into harness."

"Don't kid yourself, Cy," said Bill. "With all them guys resignin' left an' right? An' I don't blame 'em. Did you take a good look at that last one?"

He nodded toward a tarpaulin-covered hulk at the back of the garage.

"It's got a big chunk torn right out of the middle of it," he said. "Slick as a whistle. Looks sorta like some big monster just leaned over an' took a bite right outta the middle of that car."

"I know," nodded the foreman. "They're all the same. But them scientists come in an' tested. There ain't no radioactivity, anyhow."

"Yeah," said Bill, with heavy sarcasm. "An' we kin salvage the wheels an' the bumpers. But what about them poor Joes that were in it?"

"They were cops," said the foreman simply. "They done their duty."

"Look," said Bill, "I've been shot four times myself when I was on the squad. That's one thing. Whatever did this is another thing."

"We're livin' in funny times," said the foreman slowly. "I guess I'm glad I got most of my livin' over an' done with."

"All I'm askin' is a fightin' chance," said Bill, almost plaintively. "That's all I ever asked. But this thing that bites off the whole body of a squad car in one gulp is too big fer me."

"You an' Chuck better start takin' that one apart," said the foreman. "Cut up what's left of the body panels with the torch, like you done before. They don't want no trace of that car left. Tell Chuck I said fer him to let that ring job go until he's through helpin' you."

". . . So that's how it is, Son," said Detective First-Grade Albert Jackson. "I'm not supposed to say anything about the Lone Bandit to anyone, let alone a fifteen-year-old kid; but, well, there's only the two of us in the family. I want you to understand if anything happens to me."

"Sure, Dad," said Ronnie Jackson. "We always talk everything over. I won't tell anyone anything you told me about the Lone Bandit. But . . . boy! . . . wouldn't I like to tell the guys in the Space Club about it! Brother!"

"I'd forgotten this sort of thing was right up your alley," said Albert Jackson, smiling wanly. "How're all those junior Buck Rogerses coming along?"

"Fine, Dad," said Ronnie. "We're even getting out a quarterly paper of our own now. Got chapters in two new states last month, too. Bet they'd run a special edition if I could write a

story about the Lone Bandit."

"Yeah," said the detective. "I guess all those magazines you keep reading about Martian monsters and death-ray guns aren't so far off the beam at that."

"Do they think he's a Martian, Dad? You didn't tell me about that." There was a note of reproach in his voice.

"No," said the detective. "No, I don't believe they think he's a Martian. They've got us looking around here on Earth, anyhow. The only chance is to catch him sometime when he doesn't have his disintegrator-ray gun ready for action. How're you going to find an ordinary-looking guy of maybe forty-five or fifty unless he's got his ray gun handy so you can identify him?"

"No record, Dad?"

"At least none of the folks who've seen him and lived to talk about it recognize any of the photos in our files. It's like looking in a haystack for a needle, if he doesn't have a record."

"Well, if he's not a Martian," said Ronnie, "he shouldn't be hard to find."

The detective reached out his hand and tousled his son's already untidy shock of hair.

"What's so tough about tracking down a Martian, Kid?" he said. "You could draw me a picture and I'd take it around and show it to people. Even in this town, which is full of strange looking characters, we'd find him in a hurry."

"Well, a Martian would have brought his disintegrator-ray gun with him," explained the detective's son. "But if this Lone Bandit is an Earthman who has invented a disintegrator-ray gun, all you have to do is look for the place he tested it to find out just about where he lives."

"Huh?"

"Sure, Dad. Wouldn't you want to test a disintegrator-gun after you'd finished making it? All you need to do is look for some new caves in the hills back of town."

"It's a point, Kid," said Jackson, looking speculatively at his son. "But those hills are full of caves. It would be like looking for a bullet hole in a Swiss cheese."

"No it wouldn't, Dad. All you'd have to do is ask the kids in the neighborhoods close to the caves if there were any new ones all of a sudden. The kids would know all about the caves."

"Come on, Son," said the detective, "let's get in the car and give it a try. If we can only localize the guy . . . maybe find some kid who saw a man wandering around the hills with a box about so big—"

"And who," demanded Chief of Detectives Daniel Carey, "was the fool who shot the disintegrator-gun out of his hands?"

"Who do you think?" said Lieu-

tenant Hans Schaeffer. "One of those FBI characters. Nothing we can do about it."

"The autopsy report shows the guy was so full of lead," said Daniel Carey, "it must have taken four men to carry him on a stretcher out of his shack, and some jerk has to put a big, fat slug right through the mechanism of that ray-gun."

"Better get out a statement to the papers right away," advised the lieutenant. "Give our boy credit for the detective work before they grab it. Only way you can get back at those guys."

"Maybe it was a good thing, at that," said Chief Carey. "Maybe the scientists won't be able to figure out how to reconstruct that gun. Suits me fine. This Jackson . . . our boy . . . he's a first-grader now?"

"Yes sir," said the lieutenant. "There's a lieutenancy open now, too, as it happens. Better give it to him on the courthouse steps or something. Make a big fuss about it and clinch the credit for us."

"It's a big jump," said the chief.

"Nobody on the force will kick, believe me," said Lieutenant Schaeffer.

"I guess not," said the chief.

"Funny guy, this Jackson," said the lieutenant.

"You know him?"

"No," said the lieutenant. "Seen him around, naturally. I mean he said a funny thing after it was all over. He was out there with us for the kill. He said he was sure glad his kid wasn't a detective-story fan."

"Funny thing for a detective to be saying," agreed Carey.

"Yeah," said the lieutenant. "He said there wasn't enough future in it."

THE END

OPERATION SYNDROME

BY FRANK HERBERT

***There are** a lot of super-weapons lying around—A-bombs, H-bombs, and bacteriological weapons. But there's an old force worse than these!* Panic.

Illustrated by Faragasso

Honolulu is quiet, the dead buried, the rubble of buildings cleaned away. A salvage barge rocks in the Pacific swell off Diamond Head. Divers follow a bubble trail down into the green water to the wreck of the Stateside skytrain. The Scramble Syndrome did this. Ashore, in converted barracks, psychologists work fruitlessly in the aftermath of insanity. This is where the Scramble Syndrome started: one minute the city was peaceful; a clock tick later the city was mad.

In forty days—nine cities infected.

The twentieth century's Black Plague.

SEATTLE

First a ringing in the ears, fluting up to a whistle. The whistle became the warning blast of a nightmare train roaring clackety-clack, clackety-clack across his dream.

A psychoanalyst might have enjoyed the dream as a clinical study. This psychoanalyst was not studying the dream; he was having it. He clutched the sheet around his neck, twisted silently on the bed, drawing his knees under his chin.

The train whistle modulated into the contralto of an expensive chanteuse singing "Insane Crazy Blues." The dream carried vibrations of fear and wildness.

"A million dollars don't mean a thing—"

Hoarse voice riding over clarion brass, bumping of drums, clarinet squealing like an angry horse.

A dark-skinned singer with electric blue eyes and dressed in black stepped

away from a red backdrop. She opened her arms to an unseen audience. The singer, the backdrop lurched into motion, revolving faster and faster and faster until it merged into a pinpoint of red light. The red light dilated to the bell mouth of a trumpet sustaining a minor note.

The music shrilled; it was a knife cutting his brain.

Dr. Eric Ladde awoke. He breathed rapidly; he oozed perspiration. Still he heard the singer, the music.

I'm dreaming that I'm awake, he thought.

He peeled off the top sheet, slipped his feet out, put them on the warm floor. Presently, he stood up, walked to the window, looked down on the moontrail shimmering across Lake Washington. He touched the sound switch beside the window and now he could hear the night—crickets, spring peepers at the lakeshore, the far hum of a skytrain.

The singing remained.

He swayed, gripped at the windowsill.

Scramble Syndrome—

He turned, examined the bedside newstape: no mention of Seattle. Perhaps he was safe—illness. But the music inside his head was no illness.

He made a desperate clutch for self-control, shook his head, banged his ear with the palm of his hand. The singing persisted. He looked to the bedside clock—1:05 a.m., Friday, May 14, 1999.

Inside his head the music stopped. But now—Applause! A roar of clapping, cries, stamping of feet. Eric rubbed his head.

I'm not insane . . . I'm not insane—

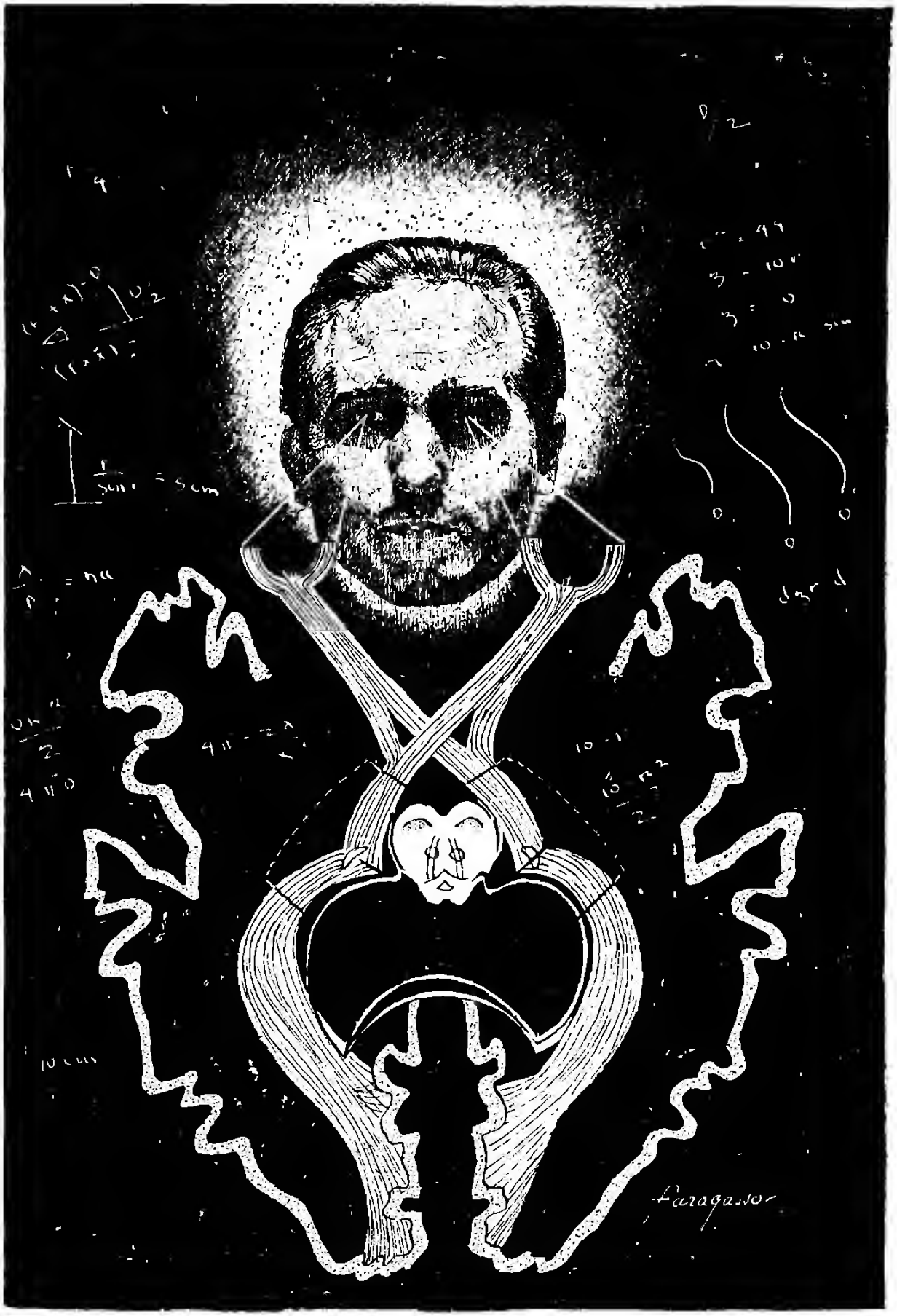
He slipped into his dressing gown, went into the kitchen cubicle of his bachelor residence. He drank water, yawned, held his breath—anything to drive away the noise, now a chicken-haggle of talking, clinking, slithering of feet.

He made himself a highball, splashed the drink at the back of his throat. The sounds inside his head turned off. Eric looked at the empty glass in his hand, shook his head.

A new specific for insanity—alcohol! He smiled wryly. *And every day I tell my patients that drinking is no solution.* He tasted a bitter thought: *Maybe I should have joined that therapy team, not stayed here trying to create a machine to cure the insane. If only they hadn't laughed at me—*

He moved a fibreboard box to make room beside the sink, put down his glass. A notebook protruded from the box, sitting atop a mound of electronic parts. He picked up the notebook, stared at his own familiar block printing on the cover: *Amanti Teleprobe—Test Book IX.*

They laughed at the old doctor, too, he thought. *Laughed him right into an asylum. Maybe that's where I'm headed—along with everyone else in the world.*



He opened the notebook, traced his finger along the diagram of his latest experimental circuit. The teleprobe in his basement laboratory still carried the wiring, partially dismantled.

What was wrong with it?

He closed the notebook, tossed it back into the box. His thoughts hunted through the theories stored in his mind, the knowledge saved from a thousand failures. Fatigue and despondency pulled at him. Yet, he knew that the things Freud, Jung, Adler and all the others had sought in dreams and mannerisms hovered just beyond his awareness in an electronic tracer circuit.

He wandered back into his study-bedroom, crawled into the bed. He practiced yoga breathing until sleep washed over him. The singer, the train, the whistle did not return.

Morning lighted the bedroom. He awoke, trailing fragments of his nightmare into consciousness, aware that his appointment book was blank until ten o'clock. The bedside newstape offered a long selection of stories, most headed "Scramble Syndrome." He punched code letters for eight items, flipped the machine to audio and listened to the news while dressing.

Memory of his nightmare nagged at him. He wondered, "How many people awake in the night, asking themselves, 'Is it my turn now?'"

He selected a mauve cape, drew it over his white coveralls. Retrieving the notebook from the box in the kitchen, he stepped out into the chill spring morning. He turned up the temperature adjustment of his coveralls. The unitube whisked him to the Elliott Bay waterfront. He ate at a seafood restaurant, the teleprobe notebook open beside his plate. After breakfast, he found an empty bench outside facing the bay, sat down, opened the notebook. He found himself reluctant to study the diagrams, stared out at the bay.

Mists curled from the gray water, obscuring the opposite shore. Somewhere in the drift a purse seiner sounded its hooter. Echoes bounced off the buildings behind him. Early workers hurried past, voices stilled: thin look of faces, hunted glances—the uniform of fear. Coldness from the bench seeped through his clothing. He shivered, drew a deep breath of the salt air. The breeze off the bay carried essence of seaweed, harmonic on the dominant bitter musk of a city's effluvia. Seagulls haggled over a morsel in the tiderip. The papers on his lap fluttered. He held them down with one hand, watching the people.

I'm procastinating, he thought. *It's a luxury my profession can ill afford nowadays.*

A woman in a red fur cape approached, her sandals tapping a swift rhythm on the concrete. Her cape billowed behind in a puff of breeze.

He looked up to her face framed in dark hair. Every muscle in his body

locked. She was the woman of his nightmare down to the minutest detail! His eyes followed her. She saw him staring, looked away, walked past.

Eric fumbled his papers together, closed the notebook and ran after her. He caught up, matched his steps to hers, still staring, unthinking. She looked at him, flushed, looked away.

"Go away or I'll call a cop!"

"Please, I have to talk to you."

"I said go away." She increased her pace; he matched it.

"Please forgive me, but I dreamed about you last night. You see—"

She stared straight ahead.

"I've been told *that* one before! Go away!"

"But you don't understand."

She stopped, turned and faced him, shaking with anger. "But I *do* understand! You saw my show last night! You've dreamed about me!" She wagged her head. "Miss Lanai, I *must* get to know you!"

Eric shook his head. "But I've never even heard of you or seen you before."

"Well! I'm not accustomed to being insulted either!" She whirled, walked away briskly, the red cape flowing out behind her. Again he caught up with her.

"Please—"

"I'll scream!"

"I'm a psychoanalyst."

She hesitated, slowed, stopped. A puzzled expression flowed over her face. "Well, that's a new approach."

He took advantage of her interest. "I really did dream about you. It was most disturbing. I couldn't shut it off."

Something in his voice, his manner —She laughed, "A real dream was bound to show up some day."

"I'm Dr. Eric Ladde."

She glanced at the caduceus over his breast pocket. "I'm Colleen Lanai; I sing."

He winced. "I know."

"I thought you'd never heard of me."

"You sang in my dream."

"Oh." A pause. "Are you really a psychoanalyst?"

He slipped a card from his breast pocket, handed it to her. She looked at it.

"What does 'Teleprobe Diagnosis' mean?"

"That's an instrument I use."

She returned the card, linked an arm through his, set an easy, strolling pace. "All right, doctor. You tell me about your dream and I'll tell you about my headaches. Fair exchange?" She peered up at him from under thick eyelashes.

"Do you have headaches?"

"Terrible headaches." She shook her head.

Eric looked down at her. Some of the nightmare unreality returned. He thought, "What am I doing here? One doesn't dream about a strange face and then meet her in the flesh the next day. The next thing I know the whole

world of my unconscious will come alive."

"Could it be this Syndrome thing?" she asked. "Ever since we were in Los Angeles I've—" She chewed at her lip.

He stared at her. "You were in Los Angeles?"

"We got out just a few hours before that . . . before—" She shuddered. "Doctor, what's it like to be crazy?"

He hesitated. "It's no different from being sane—for the person involved." He looked out at the mist lifting from the bay. "The Syndrome appears similar to other forms of insanity. It's as though something pushed people over their lunacy thresholds. It's strange; there's a rather well defined radius of about sixty miles which it saturated. Atlanta and Los Angeles, for instance, and Lawton, had quite sharp lines of demarcation: people on one side of a street got it; people on the other side didn't. We suspect there's a contamination period during which—" He paused, looked down at her, smiled. "And all you asked was a simple question. This is my lecture personality. I wouldn't worry too much about those headaches; probably diet, change of climate, maybe your eyes. Why don't you get a complete physical?"

She shook her head. "I've had six physicals since we left Karachi: same thing—four new diets." She shrugged. "Still I have headaches."

Eric jerked to a stop, exhaled slowly. "You were in Karachi, too?"

"Why, yes; that was the third place we hit after Honolulu."

He leaned toward her. "And Honolulu?"

She frowned. "What is this, a cross-examination?" She waited. "Well—"

He swallowed, thought, *How can one person have been in these cities the Syndrone hit and be so casual about it?*

She tapped a foot. "Cat got your tongue?"

He thought, *She's so flippant about it.*

He ticked off the towns on his fingers. "You were in Los Angeles, Honolulu, Karachi; you've hit the high spots of Syndrome contamination and—"

An animal cry, sharp, exclamatory, burst from her. "It got all of those places?"

He thought, *How could anyone be alive and not know exactly where the Syndrome has been?*

He asked, "Didn't you know?"

She shook her head, a numb motion, eyes wide, staring. "But Pete said—" She stopped. "I've been so busy learning new numbers. We're reviving the old time hot jazz."

"How could you miss it? TV is full of it, the newstapes, the transgraphs."

She shrugged. "I've just been so busy. And I don't like to think about such things. Pete said—" She shook her head. "You know, this is the first time I've been out alone for a walk in over a month. Pete was asleep and—"

Her expression softened. "That Pete; he must not have wanted me to worry."

"If you say so, but—" He stopped. "Who's Pete?"

"Haven't you heard of Pete Serantis and the musikron?"

"What's a musikron?"

She shook back a curl of dark hair. "Have your little joke, doctor."

"No, seriously. What's a musikron?"

She frowned. "You *really* don't know what the musikron is?"

He shook his head.

She chuckled, a throaty sound, controlled. "Doctor, you talk about *my* not knowing about Karachi and Honolulu. Where have you been hiding your head? Variety has us at the top of the heap."

He thought, "She's serious!"

A little stiffly, he said, "Well, I've been quite busy with a research problem of my own. It deals with the Syndrome."

"Oh." She turned, looked at the gray waters of the bay, turned back. She twisted her hands together. "Are you sure about Honolulu?"

"Is your family there?"

She shook her head. "I have no family. Just friends." She looked up at him, eyes shining. "Did it get . . . everybody?"

He nodded, thought: *She needs something to distract her attention.*

He said, "Miss Lanai, could I ask a favor?" He plunged ahead, not waiting for an answer. "You've been three places where the Syndrome hit. Maybe there's a clue in your patterns. Would you consent to undergoing a series of tests at my lab? They wouldn't take long."

"I couldn't possibly; I have a show to do tonight. I just sneaked out for a few minutes by myself. I'm at the Gweduc Room. Pete may wake up and —" She focused on his pleading expression. "I'm sorry, doctor. Maybe some other time. You wouldn't find anything important from me anyway."

He shrugged, hesitated. "But I haven't told you about my dream."

"You tempt me, doctor. I've heard a lot of phony dream reports. I'd appreciate the McCoy for just once. Why don't you walk me back to the Gweduc Room? It's only a couple of blocks."

"Okay."

She took his arm.

"Half a loaf—"

He was a thin man with a twisted leg, a pinched, hating face. A cane rested against his knee. Around him wove a spiderweb maze of wires—musikron. On his head, a dome-shaped hood. A spy, unsuspected, he looked out through a woman's eyes at a man who had identified himself as Dr. Eric Ladde. The thin man sneered, heard through the woman's ears: "Half a loaf—"

On the bayside walk, Eric and

Colleen matched steps.

"You never did tell me what a musikron is."

Her laughter caused a passing couple to turn and stare. "O.K. But I still don't understand. We've been on TV for a month."

He thought, *She thinks I'm a fuddy; probably am!*

He said, "I don't subscribe to the entertainment circuits. I'm just on the science and news networks."

She shrugged. "Well, the musikron is something like a recording and playback machine; only the operator mixes in any new sounds he wants. He wears a little metal bowl on his head and just thinks about the sounds—the musikron plays them." She stole a quick glance at him, looked ahead. "Everyone says it's a fake; it really isn't."

Eric stopped, pulled her to a halt. "That's fantastic. Why—" He paused, chuckled. "You know, you happen to be talking to one of the few experts in the world on this sort of thing. I have an encephalo-recorder in my basement lab that's the last word in teleprobes . . . that's what you're trying to describe." He smiled. "The psychiatrists of this town may think I'm a young upstart, but they send me their tough diagnostic cases." He looked down at her. "So let's just admit your Pete's machine is artistic showmanship, shall we?"

"But it isn't just showmanship. I've heard the records before they go into the machine and when they come out of it."

Eric chuckled.

She frowned. "Oh, you're so supercilious."

Eric put a hand on her arm. "Please don't be angry. It's just that I know this field. You don't want to admit that Pete has fooled you along with all the others."

She spoke in a slow, controlled cadence: "Look . . . doctor . . . Pete was . . . one . . . of . . . the . . . inventors . . . of . . . the . . . musikron . . . Pete . . . and . . . old . . . Dr. . . . Amanti." She squinted her eyes, looking up at him. "You may be a big wheel in this business, but I know what I've heard."

"You said Pete worked on this musikron with a doctor. What did you say that doctor's name was?"

"Oh, Dr. Carlos Amanti. His name's on a little plate inside the musikron."

Eric shook his head. "Impossible. Dr. Carlos Amanti is in an asylum."

She nodded. "That's right; Wailiku Hospital for the Insane. That's where they worked on it."

Eric's expression was cautious, hesitant. "And you say when Pete thinks about the sounds, the machine produces them?"

"Certainly."

"Strange I'd never heard about this musikron before."

"Doctor, there are a lot of things you've never heard about."

He wet his lips with his tongue. "Maybe you're right." He took her arm, set a rapid pace down the walkway. "I want to see this musikron."

In Lawton, Oklahoma, long rows of prefabricated barracks swelter on a sunbaked flat. In each barracks building, little cubicles; in each cubicle, a hospital bed; on each hospital bed, a human being. Barracks XRO-29: a psychiatrist walks down the hall, behind him an orderly pushing a cart. On the cart, hypodermic needles, syringes, antiseptics, sedatives, test tubes. The psychiatrist shakes his head.

"Baily, they certainly nailed this thing when they called it the Scramble Syndrome. Stick an egg-beater into every psychosis a person could have, mix 'em up, turn 'em all on."

The orderly grunts, stares at the psychiatrist.

The psychiatrist looks back. "And we're not making any progress on this thing. It's like bailing out the ocean with a sieve."

Down the hallway a man screams. Their footsteps quicken.

The Gweduc Room's elevator dome arose ahead of Eric and Colleen, a half-melon inverted on the walkway. At the top of the dome a blue and red script-ring circled slowly, spelling out, "Colleen Lanai with Pete Sarantis and the Musikron."

On the walkway before the dome a thin man, using a cane to compensate for a limp, paced back and forth. He looked up as Eric and Colleen approached.

"Pete," she said.

The man limped toward them, his cane staccato on the paving.

"Pete, this is Dr. Ladde. He's heard about Dr. Amanti and he wants to—"

Pete ignored Eric, stared fiercely at Colleen. "Don't you know we have a show tonight? Where have you been?"

"But, it's only a little after nine; I don't—"

Eric interrupted. "I was a student of Dr. Amanti's. I'm interested in your musikron. You see, I've been carrying on Dr. Amanti's researches and—"

The thin man barked, "No time!" He took Colleen's arm, pulled her toward the dome.

"Pete, please! What's come over you?" She held back.

Pete stopped, put his face close to hers. "Do you like this business?"

She nodded mutely, eyes wide.

"Then let's get to work!"

She looked back at Eric, shrugged her shoulders. "I'm sorry."

Pete pulled her into the dome.

Eric stared after them. He thought, "He's a decided compulsive type . . . very unstable. May not be as immune to the Syndrome as she apparently is." He frowned, looked at his wrist watch, remembered his ten o'clock appointment. "Damn!" He turned, almost collided with a young man in bus boy's coveralls.

The young man puffed nervously at a cigarette, jerked it out of his mouth, leered. "Better find yourself another gal, Doc. That one's taken."

Eric looked into the young-old eyes, stared them down. "You work in there?"

The young man replaced the cigarette between thin lips, spoke around a puff of blue smoke. "Yeah."

"When does it open?"

The young man pulled the cigarette from his mouth, flipped it over Eric's shoulder into the bay. "We're open now for breakfast. Floor show doesn't start until seven tonight."

"Is Miss Lanai in the floor show?"

The bus boy looked up at the scriptring over the dome, smiled knowingly. "Doc, she *is* the floor show!"

Again Eric looked at his wristwatch, thought, *I'm coming back here tonight.* He turned toward the nearest unitube. "Thanks," he said.

"You better get reservations if you're coming back tonight," said the bus boy.

Eric stopped, looked back. He reached into his pocket, found a twenty-buck piece, flipped it to the bus boy. The thin young man caught the coin out of the air, looked at it, said, "Thank *you*. What name, Doc?"

"Dr. Eric Ladde."

The bus boy pocketed the coin. "Righto, Doc. Floorside. I come on again at six. I'll attend to you personally."

Eric turned back to the unitube entrance again and left immediately.

Under the smog-filtered Los Angeles sun, a brown-dry city.

Mobile Laboratory 31 ground to a stop before Our Lady of Mercy Hospital, churning up a swirl of dried palm fronds in the gutter. The overworked turbo-motor sighed to a stop, grating. The Japanese psychologist emerged on one side, the Swedish doctor on the other. Their shoulders sagged.

The psychologist asked, "Ole, how long since you've had a good night's sleep?"

The doctor shook his head. "I can't remember, Yoshi; not since I left Frisco, I guess."

From the caged rear of the truck, wild, high-pitched laughter, a sigh, laughter.

The doctor stumbled on the steps to the hospital sidewalk. He stopped, turned. "Yoshi—"

"Sure, Ole. I'll get some fresh orderlies to take care of this one." To himself he added, "If there are any fresh orderlies."

Inside the hospital, cool air pressed down the hallway. The Swedish doctor stopped a man with a clip board. "What's the latest count?"

The man scratched his forehead with a corner of the clipboard. "Two and a half million last I heard, doctor. They haven't found a sane one yet."

The Gweduc Room pointed a plastine finger under Elliott Bay. Unseen

by the patrons, a cage compressed a high density of sea life over the transparent ceiling. Illumabeams traversed the water, treating the watchers to visions of a yellow salmon, a mauve perch, a pink octopus, a blue jellyfish. At one end of the room, synthetic mother-of-pearl had been formed into a giant open gweduc shell—the stage. Colored spotlights splashed the backdrop with ribbons of flame, blue shadows.

Eric went down the elevator, emerged in an atmosphere disturbingly reminiscent of his nightmare. All it lacked was the singer. A waiter led him, threading a way through the dim haze of perfumed cigarette smoke, between tables ringed by men in formal black, women in gold lamé, luminous synthetics. An aquamarine glow shimmered from the small round table tops —the only lights in the Gweduc Room other than spotlights on the stage and illumabeams in the dark water overhead. A susurration of many voices hung on the air. Aromas of alcohol, tobacco, perfumes, exotic seafoods layered the room, mingled with a perspirant undertone.

The table nestled in the second row, crowded on all sides. The waiter extricated a chair; Eric sat down.

"Something to drink, sir?"

"Bombay Ale."

The waiter turned, merged into the gloom.

Eric tried to move his chair into a comfortable position, found it was wedged immovably between two chairs behind him. A figure materialized out of the gloom across from him; he recognized the bus boy.

"Best I could get you, Doc."

"This is excellent." Eric smiled, fished a twenty-buck piece from his pocket, pressed it into the other's hand.

"Anything I can do for you, Doc?"

"Would you tell Miss Lanai I'm here?"

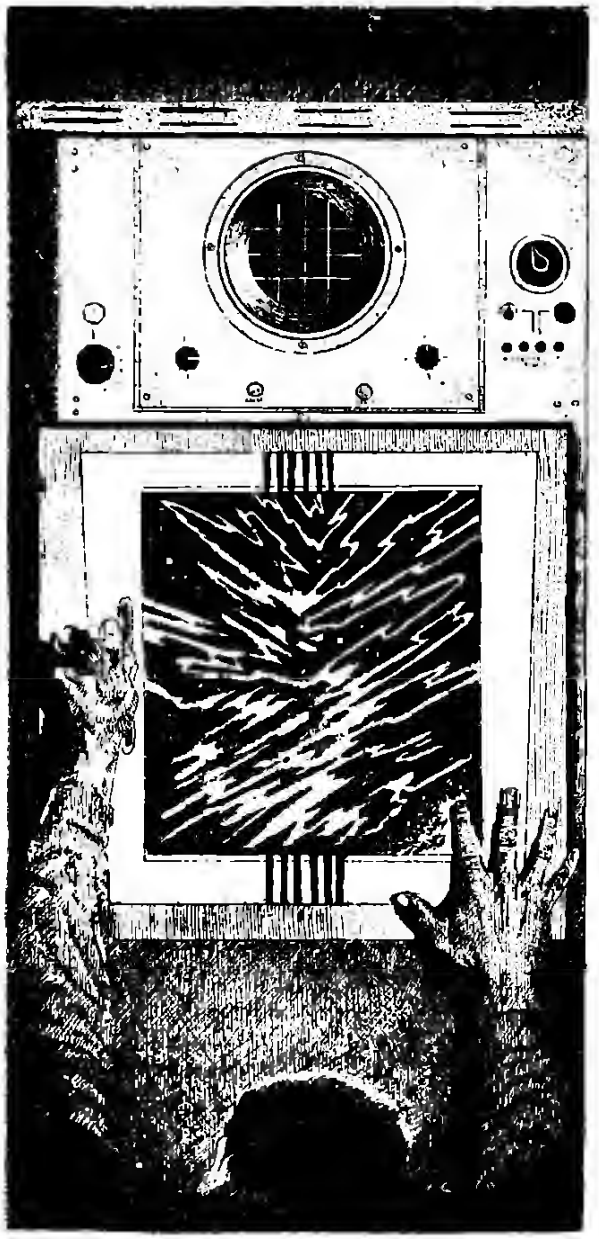
"I'll try, Doc; but that Pete character has been watching her like a piece of prize property all afternoon. Not that I wouldn't do the same thing myself, you understand."

White teeth flashed in the smoke-layered shadows. The bus boy turned, weaved his way back through the tables. The murmuring undercurrent of voices in the room damped out. Eric turned toward the stage. A portly man in ebony and chalk-striped coveralls bent over the microphone.

"Here's what you've been waiting for," he said. He gestured with his left hand. Spotlights erased a shadow, revealing Colleen Lanai, her hands clasped in front of her. An old-fashioned gown of electric blue to match her eyes sheathed the full curves.

"Colleen Lanai!"

Applause washed over the room, subsided. The portly man gestured with his right hand. Other spotlights flared, revealing Pete Serantis in black coveralls, leaning on his cane.



"Pete Serantis and—"

He waited for a lesser frenzy of clapping to subside.

". . . The Musikron!"

A terminal spotlight illuminated a large metallic box behind Pete. The thin man limped around the box, ducked, and disappeared inside. Colleen took the microphone from the announcer, who bowed and stepped off the stage.

Eric became aware of a pressing mood of urgency in the room. He thought, "For a brief instant we forget our fears, forget the Syndrome, everything except the music and this instant."

Colleen held the microphone intimately close to her mouth.

"We have some more real oldies for you tonight," she said. An electric pressure of personality pulsed out from her. "Two of these songs we've never presented before. First, a trio—'Terrible Blues' with the musikron giving you a basic recording by Clarence Williams and the Red Onion Jazz Babies. Pete Serantis adding an entirely new effect; next, 'Wild Man Blues' and the trumpet is pure Louis Armstrong; last, 'Them's Graveyard Words,' an old Bessie Smith special." She bowed almost imperceptibly.

Music appeared in the room, not definable as to direction. It filled the senses. Colleen began to sing, seemingly without effort. She played her voice like a horn, soaring with the music, ebbing with it, caressing the air with it.

Eric stared, frozen, with all the rest of the audience.

She finished the first song. The noise of applause deafened him. He felt pain in his hands, looked down to find himself beating his palms together. He stopped, shook his head, took four deep breaths. Colleen picked up the thread of a new melody. Eric

narrowed his eyes, staring at the stage. Impulsively, he put his hands to his ears and felt panic swell as the music remained undiminished. He closed his eyes, caught his breath as he continued to see Colleen, blurred at first, shifting, then in a steady image from a place nearer and to the left.

A wavering threnody of emotions accompanied the vision. Eric put his hands before his eyes. The image remained. He opened his eyes. The image again blurred, shifted to normal. He searched to one side of Colleen for the position from which he had been seeing her. He decided it could only be from inside the musikron and at the instant of decision discerned the outline of a mirror panel in the face of the metallic box.

"Through a one-way glass," he thought. "Through Pete's eyes."

He sat, thinking, while Colleen finished her third number. Pete emerged from the musikron to share the applause. Colleen blew a kiss to the audience.

"We'll be back in a little while."

She stepped down from the stage, followed by Pete; darkness absorbed them. Waiters moved among the tables. A drink was placed on Eric's table. He put money in the tray. A blue shadow appeared across from him, slipped into the chair.

"Tommy told me you were here . . . the bus boy." She leaned across the table. "You mustn't let Pete see you. He's in a rage, a real pet. I've never seen anybody that angry."

Eric leaned toward her, caught a delicate exhalation of sandalwood perfume. It dizzied him. "I want to talk to you," he said. "Can you meet me after the show?"

"I guess I can trust you," she said. She hesitated, smiling faintly. "You're the professional type." Another pause. "And I think I need professional advice." She slipped out of the chair, stood up. "I have to get back before he suspects I didn't go to the powder room. I'll meet you near the freight elevator upstairs."

She was gone.

A cold breeze off the bay tugged at Eric's cape, puffing it out behind him. He leaned against the concrete railing, drawing on a cigarette. The glowing coal flowed an orange wash across his face, flaring, dimming. The tide rip sniggled and babbled; waves lap-lap-lapped at the concrete beneath him. A multi-colored glow in the water to his left winked out as the illumabeams above the Gweduc Room were extinguished. He shivered. Footsteps approached from his left, passed behind him—a man, alone. A muffled whirring sound grew, stopped. Light footsteps ran toward him, stopped at the rail. He smelled her perfume.

"Thanks," he said.

"I can't be long. He's suspicious. Tommy brought me up the freight elevator. He's waiting."

"I'll be brief. I've been thinking.

I'm going to talk about travel. I'm going to tell you where you've been since you hooked up with Pete in Honolulu." He turned, leaned sideways against the railing. "You tried your show first in Santa Rosa, California, the sticks; then you went to Piquetberg, Karachi, Reykjavik, Portland, Hollandia, Lawton—finally, Los Angeles. Then you came here."

"So you looked up our itinerary."

He shook his head. "No." He hesitated. "Pete's kept you pretty busy rehearsing, hasn't he?"

"This isn't easy work."

"I'm not saying it is." He turned back to the rail, flipped his cigarette into the darkness, heard it hiss in the water. "How long have you known Pete?"

"A couple of months more or less. Why?"

He turned away. "What kind of a fellow is he?"

She shrugged. "He's a nice guy. He's asked me to marry him."

Eric swallowed. "Are you going to?"

She looked out to the dark bay. "That's why I want your advice. I don't know . . . I just don't know. He put me where I am, right on top of the entertainment heap." She turned back to Eric. "And he really is an awfully nice guy . . . when you get under that bitterness."

Eric breathed deeply, pressed against the concrete railing. "May I tell you a story?"

"What about?"

"This morning you mentioned Dr. Carlos Amanti, the inventor of the teleprobe. Did you know him?"

"No."

"I was one of his students. When he had the breakdown it hit all of us pretty hard, but I was the only one who took up the teleprobe project. I've been working at it eight years."

She stirred beside him. "What is this teleprobe?"

"The science writers have poked fun at it; they call it the 'mind reader.' It's not. It's just a means of interpreting some of the unconscious impulses of the human brain. I suppose some day it may approach mind reading. Right now it's a rather primitive instrument, sometimes unpredictable. Amanti's intention was to communicate with the unconscious mind, using interpretation of encephalographic waves. The idea was to amplify them, maintain a discrete separation between types, and translate the type variations according to thought images."

She chewed her lower lip. "And you think the musikron would help make a better teleprobe, that it would help fight the Syndrome?"

"I think more than that." He looked down at the paving.

"You're trying to tell me something without saying it," she said. "Is it about Pete?"

"Not exactly."

"Why'd you give that long reci-

tation of where we'd been? That wasn't just idle talk. What are you driving at?"

He looked at her speculatively, weighing her mood. "Hasn't Pete told you about those places?"

She put a hand to her mouth, eyes wide, staring. She moaned. "Not the Syndrome . . . not all of those places, too?"

"Yes." It was a flat, final sound.

She shook her head. "What are you trying to tell me?"

"That it could be the musikron causing all of this."

"Oh, no!"

"I could be wrong. But look at how it appears. Amanti was a genius working near the fringe of insanity. He had a psychotic break. Then he helped Pete build a machine. It's possible that machine picks up the operator's brain wave patterns, transmits them as a scrambling impulse. The musikron *does* convert thought into a discernible energy—sound. Why isn't it just as possible that it funnels a disturbing impulse directly into the unconscious." He wet his lips with his tongue. "Did you know that I hear those sounds even with my hands over my ears, see you with my eyes covered. Remember my nightmare? My nervous system is responding to a subjective impulse."

"Does it do the same thing to everybody?"

"Probably not. Unless a person was conditioned as I have been by spending years in the aura of a similar machine, these impulses would be censored at the threshold of consciousness. They would be repressed as unbelievable."

Her lips firmed. She shook her head. "I don't see how all this scientific gobbledy-gook proves the musikron caused the Syndrome."

"Maybe it doesn't. But it's the best possibility I've seen. That's why I'm going to ask a favor. Could you get me the circuit diagrams for the musikron? If I could see them I'd be able to tell just what this thing does. Do you know if Pete has plans for it?"

"There's some kind of a thick notebook inside the musikron. I think that's what you mean."

"Could you get it?"

"Maybe, but not tonight . . .and I wouldn't dare tell Pete."

"Why not tonight?"

"Pete sleeps with the key to the musikron. He keeps it locked when it's not in use; so no one will get inside and get a shock. It has to be left on all the time because it takes so long to warm it up. Something about crystals or energy potential or some words like that."

"Where's Pete staying?"

"There are quarters down there, special apartments.

He turned away, breathed the damp salt air, turned back.

Colleen shivered. "I know it's not the musikron. I . . . they—" She was crying.

He moved closer, put an arm around

her shoulders, waiting. He felt her shiver. She leaned against him; the shivering subsided.

"I'll get those plans." She moved her head restlessly. "That'll prove it isn't the musikron."

"Colleen . . ." He tightened his arm on her shoulders, feeling a warm urgency within him.

She moved closer. "Yes."

He bent his head. Her lips were warm and soft. She clung to him, pulled away, nestled in his arms.

"This isn't right," she said.

Again he bent his head. She tipped her head up to meet him. It was a gentle kiss.

She pulled away slowly, turned her head toward the bay. "It can't be like this," she whispered. "So quick—without warning."

He put his face in her hair, inhaled. "Like what?"

"Like you'd found your way home."

He swallowed. "My dear."

Again their lips met. She pulled away, put a hand to his cheek. "I have to go."

"When will I see you?"

"Tomorrow. I'll tell Pete I have to do some shopping."

"Where?"

"Do you have a laboratory?"

"At my home in Chalmers Place on the other side of the lake. It's in the directory."

"I'll come as soon as I can get the diagrams."

Again they kissed.

"I really have to go."

He held her tightly.

"Really." She pulled away. "Good night"—she hesitated—"Eric." Shadows flowed in around her.

He heard the whirring of the elevator, leaned back against the concrete, drawing deep breaths to calm himself.

Deliberate footsteps approached from his left. A handlight flashed in his face, the dull gleam of a night patrolman's brassard behind the light. The light moved to the caduceus at his breast.

"You're out late, doctor."

The light returned to his face, winked off. Eric knew he had been photographed—as a matter of routine.

"Your lipstick's smudged," the patrolman said. He walked away past the elevator dome.

Inside the silent musikron: a thin man, pinched face, hating. Bitter thought: *Now wasn't that a sweet love scene!* Pause. *The doctor wants something to read?* Wry smile. *I'll* provide *it. He'll have something to occupy his mind after we've gone.*

Before going to bed, Eric filed a transgraph to Mrs. Bertz, his secretary, telling her to cancel his appointments for the next day. He snuggled up to the pillow, hugging it. Sleep avoided him. He practiced Yoga breathing. His senses remained alert. He slipped out of bed, put on a robe and sandals.

He looked at the bedside clock—2:05 a.m., Saturday, May 15, 1999. He thought, *Just twenty-five hours ago — nightmare. Now . . . I don't know.* He smiled. *Yes I do; I'm in love. I feel like a college kid.*

He took a deep breath. *I'm in love.* He closed his eyes and looked at a memory picture of Colleen. *Eric, if you only solve this Syndrome, the world is yours.* The thoughts skipped a beat. *I'm an incipient manic—*

Eric ruminated. *If Pete takes that musikron out of Seattle—What then?*

He snapped a finger, went to the vidiphone, called an all-night travel agency. A girl clerk finally agreed to look up the booking dates he wanted —for a special fee. He gave her his billing code, broke the connection and went to the microfilm rack across from the foot of his bed. He ran a finger down the title index, stopped at "Implications of Encephalographic Wave Forms, A Study of the Nine Brain Pulses, by Dr. Carlos Amanti." He pushed the selector opposite the tape, activated the screen above the rack and returned to his bed, carrying the remote-control unit.

The first page flashed on the screen; room lights dimmed automatically. He read:

"There is a scale of vibratory impulses spanning and exceeding the human auditory range which consistently produce emotional responses of fear in varying degrees. Certain of these vibratory impulses—loosely grouped under the term *sounds*—test the extremes of human emotional experience. One may say, within reason, that all emotion is response to stimulation by harmonic movement, by oscillation.

"Many workers have linked emotions with characteristic encephalographic wave responses: Carter's work on Zeta waves and love; Reymann on Pi waves and abstract thinking; Poulson on the Theta Wave Index to degrees of sorrow, to name a few.

"It is the purpose of my work to trace these characteristic responses and point out what I believe to be an entirely new direction for interpretation of—"

Because of the late hour, Eric had expected drowsiness to overtake his reading, but his senses grew more alert as he read. The words had the familiarity of much re-reading, but they still held stimulation. He recalled a passage toward the end of the book, put the film on motor feed and scanned forward to the section he wanted. He slowed the tape, returned the controls to single-page advance; there it was:

"While working with severely disturbed patients in the teleprobe, I have found a charged emotional feeling in the atmosphere. Others, unfamiliar with my work, have reported this same experience. This suggests that the characteristic emanations of a disturbed mentality may produce sympathetic reactions upon those within the unshielded field of the tele-

probe. Strangely, this disturbed sensation sometimes follows by minutes or even hours the period when the patient was under examination.

"I am hesitant to suggest a theory based upon this latter phenomenon. There is too much we do not know about the teleprobe—its latency period, for instance. However, it is possible that the combination of teleprobe and disturbed personality broadcasts a field with a depressant effect upon the unconscious functions of persons within that field. Be that as it may, this entire field of teleprobe and encephalographic wave research carries implications which—"

With a decisive gesture, Eric snapped off the projector, slipped out of bed and dressed. The bedside clock showed 3:28 a.m., Saturday, May 15, 1999. Never in his life had he felt more alert. He took the steps two at a time down to his basement lab, flipped on all the lights, wheeled out his teleprobe.

I'm on to something, he thought. *This Syndrome problem is too urgent for me to waste time sleeping.*

He stared at his teleprobe, an open framework of shelves, banks of tubes, maze of wiring, relaxing chair in the center with the metal hemisphere of the pickup directly above the chair. He thought, *The musikron is rigged for sound projection; that means a secondary resonance circuit of some kind.*

He pulled an unused tape recorder from a rack at the end of his bench, stripped the playback circuit from it. He took the recorder service manual, sketched in the changes he would need, pausing occasionally to figure circuit loads and balances on a slide rule. Presently, not too satisfied with his work, but anxious to get started, he brought out the parts he would need and began cutting and soldering. In two hours he had what he wanted.

Eric took cutter pliers, went to the teleprobe, snipped away the recorder circuit, pulled it out as a unit. He wheeled the teleprobe cage to the bench and, delicately feeling his way, checking the circuit diagrams as he went, he wired in the playback circuit. From the monitor and audio sides, he took the main leads, fed them back into the first bank of the encephalographic pickup. He put a test power source on the completed circuit and began adding resistance units by eye to balance the impedance. It took more than an hour of testing and cutting, required several units of shielding.

He stepped back, stared at the machine. He thought, *It's going to oscillate all over the place. How does he balance this monster?*

Eric pulled at his chin, thinking. *Well, let's see what this hybrid does.*

The wall clock above his bench showed 6:45 a.m. He took a deep breath, hooked an overload fuse into a relay power switch, closed the switch.

A wire in the pickup circuit blazed to incandescence; the fuse kicked out. Eric opened the switch, picked up a test meter, and returned to the machine. The fault eluded him. He went back to the circuit diagrams.

"Perhaps too much power—" He recalled that his heavy duty rheostat was at a shop being repaired, considered bringing out the auxiliary generator he had used on one experiment. The generator was beneath a pile of boxes in a corner. He put the idea temporarily aside, turned back to the teleprobe.

"If I could just get a look at that musikron."

He stared at the machine. "A resonance circuit—What else?" He tried to imagine the interrelationship of the components, fitting himself into the machine.

"I'm missing it some place! There's some other thing and I have the feeling I already know it, that I've heard it. I've got to see the diagrams on that musikron."

He turned away, went out of the lab and climbed the stairs to his kitchen. He took a coffee capsule from a package in the cupboard, put it beside the sink. The vidiphone chimed. It was the clerk from the travel bureau. Eric took down her report, thanked her, broke the connection. He did a series of subtractions."

"Twenty-eight hour time lag," he thought. "Every one of them. That's too much of a coincidence."

He experienced a moment of vertigo, followed by weariness. "I'd better get some rest. I'll come back to this thing when I'm more alert."

He padded into the bedroom, sat down on the bed, kicked off his sandals and lay back, too tired to undress. Sleep eluded him. He opened his eyes, looked at the clock: 7:00 a.m. He sighed, closed his eyes, sank into a somnolent state. A niggling worry gnawed at his consciousness. Again he opened his eyes, looked at the clock: 9:50 a.m. *But I didn't feel the time pass*, he thought. *I must have slept.* He closed his eyes. His senses drifted into dizziness, the current in a stream, a chip on the current, wandering, hunting, whirling.

He thought, *I hope he didn't see me leave.*

His eyelids snapped open and, for a moment, he saw a unitube entrance on the ceiling above his head. He shook his head.

"That was a crazy thought. Where'd that come from?" he asked himself. "I've been working too hard."

He turned on his side, returned to the somnolent state, his eyes drooping closed. Instantly, he had the sensation of being in a maze of wires; an emotion of hate surged over him so strongly it brought panic because he couldn't explain it or direct it at anything. He gritted his teeth, shook his head, opened his eyes. The emotion disappeared, leaving him weak. He

closed his eyes. Into his senses crept an almost overpowering aroma of gardenias, a vision of dawnlight through a shuttered window. His eyelids snapped open; he sat up in the bed, put his head in his hands.

Rhinencephalic stimulation, he thought. *Visual stimulation . . . auditory stimulation . . . nearly total sensorium response. It means something. But what does it mean?* He shook his head, looked at the clock: 10:10 a.m.

Outside Karachi, Pakistan, a Hindu holy man squatted in the dust beside an ancient road. Past him paraded a caravan of International Red Cross trucks, moving selected cases of Syndrome madness to the skytrain field on the Indus delta. Tomorrow the sick would be studied at a new clinic in Vienna. The truck motors whined and roared; the ground trembled. The holy man drew an ancient symbol with a finger in the dust. The wind of a passing truck stirred the pattern of Brahmaputra, twisting it. The holy man shook his head sadly.

Eric's front door announcer chimed as someone stepped onto the entrance mat. He clicked the scanner switch at his bedside, looked to the bedroom master screen; Colleen's face appeared on the screen. He punched for the door release, missed, punched again, caught it. He ran his hands through his hair, snapped the top clip of his coveralls, went to the entrance hall.

Colleen appeared tiny and hesitant standing in the hall. As he saw her, something weblike, decisive, meshed inside him—a completeness.

He thought, *Boy, in just one day you are completely on the hook.*

"Eric," she said.

Her body's warm softness clung to him. Fragrance wafted from her hair.

"I missed you," he said.

She pulled away, looked up. "Did you dream about me?"

He kissed her. "Just a normal dream."

"Doctor!"

A smile took the sting out of the exclamation. She pulled away, slipped off her fur-lined cape. From an inner pocket of the cape she extracted a flat blue booklet. "Here's the diagram. Pete didn't suspect a thing."

Abruptly, she reeled toward him, clutched at his arm, gasping.

He steadied her, frightened. "What's the matter, darling?"

She shook her head, drawing deep, shuddering breaths.

"It's nothing; just a . . . little headache."

"Little headache nothing." He put the back of his wrist against her forehead. The skin held a feverish warmth. "Do you feel ill?"

She shook her head. "No. It's going away."

"I don't like this as a symptom. Have you eaten?"

She looked up, calmer. "No, but I seldom eat breakfast . . . the waist-

line."

"Nonsense! You come in here and eat some fruit."

She smiled at him. "Yes, doctor . . . darling."

The reflection on the musikron's inner control surfaces gave an underlighted, demoniacal cast to Pete's face. His hand rested on a relay switch. Hesitant thought: *Colleen, I wish I could control your thoughts. I wish I could tell you what to do. Each time I try, you get a headache. I wish I knew how this machine* really *works.*

Eric's lab still bore the cluttered look of his night's activities. He helped Colleen up to a seat on the edge of the bench, opened the musikron booklet beside her. She looked down at the open pages.

"What are all those funny looking squiggles?"

He smiled. "Circuit diagram." He took a test clip and, glancing at the diagram, began pulling leads from the resonance circuit. He stopped, a puzzled frown drawing down his features. He stared at the diagram. "That can't be right." He found a scratch pad, stylus, began checking the booklet.

"What's wrong?"

"This doesn't make sense."

"How do you mean?"

"It isn't designed for what it's supposed to do."

"Are you certain?"

"I know Dr. Amanti's work. This isn't the way he works." He began leafing through the booklet. A page flopped loose. He examined the binding. The booklet's pages had been razored out and new pages substituted. It was a good job. If the page hadn't fallen out, he might not have noticed. "You said it was easy to get this. Where was it?"

"Right out on top of the musikron."

He stared at her speculatively.

"What's wrong?" Her eyes held open candor.

"I wish I knew." He pointed to the booklet. "That thing's as phony as a Martian canal."

"How do you know?"

"If I put it together that way" —a gesture at the booklet—"it'd go up in smoke the instant power hit it. There's only one explanation: Pete's on to us."

"But how?"

"That's what I'd like to know . . . how he anticipated you'd try to get the diagram for me. Maybe that bus boy—"

"Tommy? But he's such a nice young fellow."

"Yeah. He'd sell his mother if the price was right. He could have eavesdropped last night."

"I can't believe it." She shook her head.

In the webwork of the musikron, Pete gritted his teeth. *Hate him! Hate him!* He pressed the thought at her, saw it fail. With a violent

motion, he jerked the metal hemisphere off his head, stumbled out of the musikron. *You're not going to have her! If it's a dirty fight you want, I'll really show you a dirty fight!*

Colleen asked, "Isn't there some other explanation?"

"Can you think of one?"

She started to slide down from the bench, hesitated, lurched against him, pressing her head against his chest. "My head . . . my head—" She went limp in his arms, shuddered, recovered slowly, drew gasping breaths. She stood up. "Thank you."

In a corner of the lab was a canvas deck chair. He led her over to it, eased her down. "You're going to a hospital right now for a complete check-up—tracers, the works. I don't like this."

"It's just a headache."

"Peculiar kind of a headache."

"I'm not going to a hospital."

"Don't argue. I'm calling for reservations as soon as I can get over to the phone."

"Eric, I won't do it!" She pushed herself upright in the chair. "I've seen all the doctors I want to see." She hesitated, looked up at him. "Except you. I've had all those tests. There's nothing wrong with me . . . except something in my head." She smiled. "I guess I'm talking to the right kind of a doctor for that."

She lay back, resting, closed her eyes. Eric pulled up a stool, sat down beside her, holding her hand. Colleen appeared to sink into a light sleep, breathing evenly. Minutes passed.

If the telerobe wasn't practically dismantled, I could test her, he thought.

She stirred, opened her eyes.

"It's that musikron," he said. He took her arm. "Did you ever have headaches like this before you began working with that thing?"

"I had headaches, but . . . well, they weren't this bad." She shuddered. "I kept having horrible dreams last night about all those poor people going insane. I kept waking up. I wanted to go in and have it out with Pete." She put her hands over her face. "How can you be certain it's the musikron. You can't be sure. I won't believe it! I can't!

Eric stood up, went to the bench and rummaged under loose parts for a notebook. He returned, tossed the book into her lap. "There's your proof."

She looked at the book without opening it. "What is this?"

"It's some figures on your itinerary. I had a travel bureau check your departure times. From the time Pete would have been shutting down the musikron to the moment all hell broke loose there's an even twenty-eight-hour time lapse. That same time lag is present in each case."

She pushed the notebook from her lap. "I don't believe it. You're making this up."

He shook his head. "Colleen, what

does it mean to you that you have been each place where the Syndrome hit . . . that there was a twenty-eight-hour time lapse in each case. Isn't that stretching coincidence too far?"

"I know it's not true." Her lips thinned. "I don't know what I've been thinking of to even consider you were right." She looked up, eyes withdrawn. "It can't be true. If it was, it would mean Pete planned the whole thing. He's just not that kind of a guy. He's nice, thoughtful."

He started to put his hand on her arm. "But, Colleen, I thought—"

"Don't touch me. I don't care what you thought, or what I thought. I think you've been using your psychological ability to try to turn me away from Pete."

He shook his head, again tried to take her arm.

She pulled away. "No! I want to think and I can't think when . . . when you touch me." She stared at him. "I believe you're just jealous of Pete."

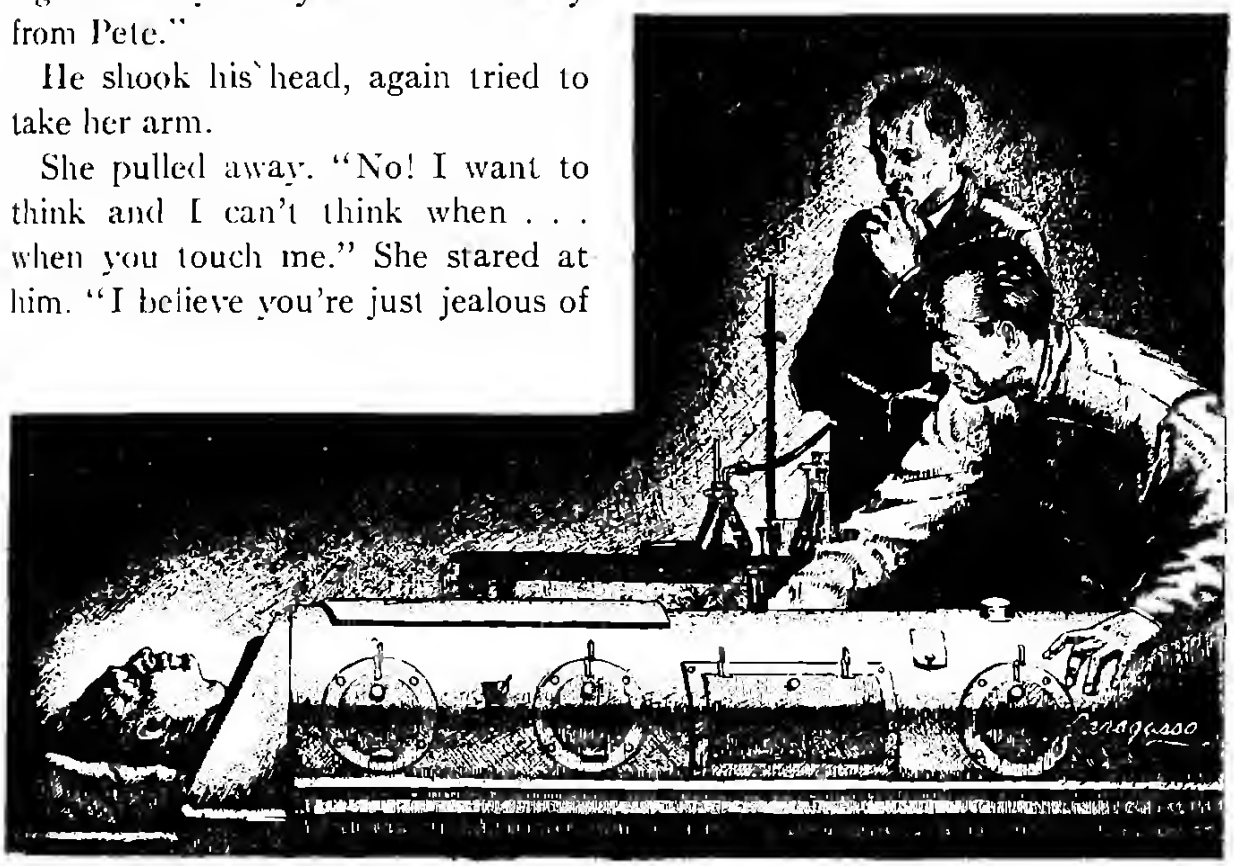
"That's not –"

A motion at the lab door caught his eye, stopped him. Pete stood there, leaning on his cane.

Eric thought, *How did he get there? I didn't hear a thing. How long has he been there?* He stood up.

Pete stepped forward. "You forgot to latch your door, doctor." He looked at Colleen. "Common enough thing. I did, too." He limped into the room, cane tapping methodically. "You were saying something about jealousy." A pause. "I understand about jealousy."

"Pete!" Colleen stared at him, turned back to Eric. "Eric, I—" She



began, and then shrugged.

Pete rested both hands on his cane, looked up at Eric. "You weren't going to leave me anything, were you, doctor—the woman I love, the musikron. You were even going to hang me for this Syndrome thing."

Eric stopped, retrieved his notebook from the floor. He handed it to Pete, who turned it over, looked at the back.

"The proof's in there. There's a twenty-eight-hour time lag between the moment you leave a community and the moment madness breaks out. You already know it's followed you around the world. There's no deviation. I've checked it out."

Pete's face paled. "Coincidence. Figures can lie; I'm no monster."

Colleen turned toward Eric, back to Pete. "That's what I told him, Pete."

"Nobody's accusing you of being a monster, Pete . . . yet," Eric said. "You *could* be a savior. The knowledge that's locked up in that musikron could practically wipe out insanity. It's a positive link with the unconscious . . . can be tapped any time. Why, properly shielded—"

"Nuts! You're trying to get the musikron so you can throw your weight around." He looked at Colleen. "And you sugar-talked her into helping you." He sneered. "It's not the first time I've been double-crossed by a woman; I guess I should've been a psychiatrist."

Colleen shook her head. "Pete, don't talk that way."

"Yeah . . . How else do you expect me to talk? You were a nobody; a canary in a hula chorus and I picked you up and set you down right on the top. So what do you do—" He turned away, leaning heavily on the cane. "You can have her, Doc; she's just your type!"

Eric put out a hand, withdrew it. "Pete! Stop allowing your deformity to deform your reason! It doesn't matter how we feel about Colleen. We've got to think about what the musikron is doing to people! Think of all the unhappiness this is causing people . . . the death . . . the pain—"

"People!" Pete spat out the word.

Eric took a step closer to him. "Stop that! You know I'm right. You can have full credit for anything that is developed. You can have full control of it. You can—"

"Don't try to kid me, Doc. It's been tried by experts. You and your big words! You're just trying to make a big impression on baby here. I already told you you can have her. I don't want her."

"Pete! You—"

"Look out, Doc; you're losing your temper!"

"Who wouldn't in the face of your pig-headedness?"

"So it's pig-headed to fight a thief, eh, Doc?" Pete spat on the floor, turned toward the door, tripped on his cane and fell.

Colleen was at his side. "Pete, are you hurt?"

He pushed her away. "I can take care of myself!" He struggled to his feet, pulling himself up on the cane.

"Pete, please—"

Eric saw moisture in Pete's eyes. "Pete, let's solve this thing."

"It's already solved, Doc." He limped through the doorway.

Colleen hesitated. "I have to go with him. I can't let him go away like this. There's no telling what he'll do."

"But don't you see what he's doing?"

Anger flamed in her eyes; she stared at Eric. "I saw what you did and it was as cruel a thing as I've ever seen." She turned and ran after Pete.

Her footsteps drummed up the stairs; the outer door slammed.

An empty fibreboard box lay on the floor beside the teleprobe. Eric kicked it across the lab.

"Unreasonable . . . neurotic . . . flighty . . . irresponsible—"

He stopped; emptiness grew in his chest. He looked at the teleprobe. "Sometimes, there's no predicting about women." He went to the bench, picked up a transistor, put it down, pushed a tumble of resistors to the back of the bench. "Should've known better."

He turned, started toward the door, froze with a thought which forced out all other awareness:

What if they leave Seattle?

He ran up the stairs three at a time, out the door, stared up and down the street. A jet car sped past with a single occupant. A woman and two children approached from his left. Otherwise, the street was empty. The unitube entrance, less than half a block away, disgorged three teen-age girls. He started toward them, thought better of it. With the tubes running fifteen seconds apart, his chance to catch them had been lost while he'd nursed his hurt.

He re-entered the apartment.

I have to do something, he thought. *If they leave, Seattle will go the way of all the others.* He sat down by the vidiphone, put his finger in the dial, withdrew it.

If I call the police, they'll want proof. What can I show them besides some time-tables? He looked out the window at his left. *The musikron! They'll see*—Again he reached for the dial, again withdrew. *What would they see? Pete would just claim I was trying to steal it.*

He stood up, paced to the window, stared out at the lake.

I could call the society, he thought.

He ticked off in his mind the current top officers of the King County Society of Psychiatric Consultants. All of them considered Dr. Eric Ladde a little too successful for one so young; and besides there was the matter of his research on the teleprobe; mostly a laughable matter.

But I have to do something . . .

the Syndrome—He shook his head. *I'll have to do it alone, whatever I do.* He slipped into a black cape, went outside and headed for the Gweduc Room.

A cold wind kicked up whitecaps in the bay, plumed spray onto the waterfront sidewalk. Eric ducked into the elevator, emerged into a lunchroom atmosphere. The girl at the check-table looked up.

"Are you alone, doctor?"

"I'm looking for Miss Lanai."

"I'm sorry. You must have passed them outside. She and Mr. Serantis just left."

"Do you know where they were going?"

"I'm sorry; perhaps if you come back this evening—"

Eric returned to the elevator, rode up to the street vaguely disquieted. As he emerged from the elevator dome, he saw a van pull away from the service dome. Eric played a hunch, ran toward the service elevator which already was whirring down.

"Hey!"

The whirring stopped, resumed; the elevator returned to street level, in it Tommy, the bus boy.

"Better luck next time, Doc."

"Where are they?"

"Well—"

Eric jammed a hand into his coin pocket, fished out a fifty-buck piece, held it in his hand.

Tommy looked at the coin, back at Eric's eyes. "I heard Pete call the Bellingham skytrain field for reservations to London."

A hard knot crept into Eric's stomach; his breathing became shallow, quick; he looked around him.

"Only twenty-eight hours—"

"That's all I know, Doc."

Eric looked at the bus boy's eyes, studying him.

Tommy shook his head. "Don't *you* start looking at me that way!" He shuddered. "That Pete give me the creeps; always staring at a guy; sitting around in that machine all day and no noises coming out of it." Again he shuddered. "I'm glad he's gone."

Eric handed him the coin. "You won't be."

"Yeah." Tommy stepped back into the elevator. "Sorry you didn't make it with the babe, Doc."

"Wait."

"Yeah?"

"Wasn't there a message from Miss Lanai?"

Tommy made an almost imperceptible motion toward the inner pocket of his coveralls. Eric's trained eyes caught the gesture. He stepped forward, gripped Tommy's arm.

"Give it to me!"

"Now look here, Doc."

"Give it to me!"

"Doc, I don't know what you're talking about."

Eric pushed his face close to the bus boy's. "Did you see what happened to Los Angeles, Lawton, Portland, all the places where the Syndrome hit?"

The boy's eyes went wide. "Doc, I—"

"Give it to me!"

Tommy darted his free hand under his coveralls, extracted a thick envelope, thrust it into Eric's hand.

Eric released the boy's arm. Scrawled on the envelope was: "This will prove you were wrong about Pete." It was signed, "Colleen."

"You were going to keep this?" Eric asked.

Tommy's lips twisted. "Any fool can see its the plans for the musikron, Doc. That thing's valuable."

"You haven't any idea," Eric said. He looked up. "They're headed for Bellingham?"

"Yeah."

The nonstop unitube put Eric at the Bellingham field in twenty-one minutes. He jumped out, ran to the station, jostling people aside. A skytrain lashed into the air at the far end of the field. Eric missed a step, stumbled, caught his balance.

In the depot, people streamed past him away from the ticket window. Eric ran up to the window, leaned on the counter. "Next train to London?"

The girl at the window consulted a screen beside her. "There'll be one at 12:50 tomorrow afternoon, sir. You just missed one."

"But that's twenty-four hours!"

"You'd arrive in London at 4:50 p.m., sir." She smiled. "Just a little late for tea." She glanced at his caduceus.

Eric clutched at the edge of the counter, leaned toward her. "That's twenty-nine hours—one hour too late."

He pushed himself away from the window, turned.

"It's *just* a four-hour trip, doctor."

He turned back. "Can I charter a private ship?"

"Sorry, doctor. There's an electrical storm coming; the traveler beam will have to be shut down. I'm sure you couldn't get a pilot to go out without the beam. You do understand?"

"Is there a way to call someone on the skytrain?"

"Is this a personal matter, doctor?"

"It's an emergency."

"May I ask the nature of the emergency?"

He thought a moment, looking at the girl. He thought, *Same problem here . . . nobody would believe me.*

He said, "Never mind. Where's the nearest vidiphone? I'll leave a message for her at Plymouth Depot."

"Down that hallway to your right, doctor." The girl went back to her tickets. She looked up at Eric's departing back. "Was it a medical emergency, doctor?"

He paused, turned. The envelope in his pocket rustled. He felt of the papers, pulled out the envelope. For the second time since Tommy had given them to him, Eric glanced inside at the folded pages of electronic diagrams, some initialed "C.A."

The girl waited, staring at him.

Eric put the envelope back in his pocket, a thought crystalizing. He glanced up at the girl. "Yes, it was a medical emergency. But you're out of range."

He turned, strode outside, back to the unitube. He thought about Colleen. *Never trust a neurotic woman. I should have known better than to let my glands hypnotize me.*

He went down the unitube entrance, worked his way out to the speed strip, caught the first car along, glad to find it empty. He took out the envelope, examined its contents during the ride. There was no doubt about it; the envelope contained the papers Pete had razored from the musikron service book. Eric recognized Dr. Amanti's characteristic scrawl.

The wall clock in his lab registered 2:10 p.m. as Eric turned on the lights. He took a blank sheet of paper from his notebook, wrote on it with grease pencil:

"DEADLINE, 4:00 p.m., Sunday, May 16th."

He tacked the sheet above his bench, spread out the circuit diagrams from the envelope. He examined the first page.

Series modulation, he thought. *Quarter wave.* He ran a stylus down the page, checked the next page. *Multiple phase-reversing.* He turned to the next page. The stylus paused. He traced a circuit, went back to the first page. *Degenerative feedback.* He shook his head. *That's impossible! There'd just be a maze of wild harmonics.* He continued on through the diagrams, stopped and read through the last two pages slowly. He went through the circuits a second time, a third time, a fourth time. He shook his head. *What is it?*

He could trace the projection of much of the diagram, amazed at the clear simplicity of the ideas. The last ten pages though—They described a series of faintly familiar circuits, reminding him of a dual frequency crystal calibrator of extremely high oscillation. "10,000 KC" was marked in the margin. But there were subtle differences he couldn't explain. For instance, there was a sign for a lower limit.

A series of them, he thought. *The harmonics hunt and change. But it can't be random. Something has to control it, balance it.*

At the foot of the last page was a notation: "Important—use only C6 midget variable, C7, C8 dual, 4ufd."

They haven't made tubes in that series for fifty years, he thought. *How can I substitute?*

He studied the diagram.

I don't stand a chance of making this thing in time. And if I do; what then? He wiped his forehead. *Why does it remind me of a crystal oscillator?* He looked at the clock—two hours had passed. *Where did the time go?* he asked himself. *I'm taking too much time just learning what this is.*

He chewed his lips, staring at the moving second hand of the clock, suddenly froze. *The parts houses will be closing and tomorrow's Sunday!*

He went to the lab vidiphone, dialed a parts house. No luck. He dialed another, checking the call sheet beside the phone. No luck. His fifth call netted a suggestion of a substitute circuit using transistors which might work. Eric checked off the parts list the clerk suggested, gave the man his package tube code.

"I'll have them out to you first thing Monday," the man said.

"But I have to have them today! Tonight!"

"I'm sorry, sir. The parts are in our warehouse; it's all locked up tight on Saturday afternoon."

"I'll pay a hundred bucks above list price for those parts."

"I'm sorry, sir; I don't have authorization."

"Two hundred."

"But—"

"Three hundred."

The clerk hesitated. Eric could see the man figuring. The three hundred probably was a week's wages.

"I'll have to get them myself after I go off duty here," the clerk said. "What else do you need?"

Eric leafed through the circuit diagrams, read off the parts lists from the margins. "There's another hundred bucks in it if you get them to me before seven."

"I get off at 5:30, doctor. I'll do my best."

Eric broke the circuit, returned to his bench, began roughing-in from the diagram with what materials he had. The teleprobe formed the basic element with surprisingly few changes.

At 5:40, the dropbell of his transgraph jangled upstairs. Eric put down his soldering iron, went upstairs, pulled out the tape. His hands trembled when he saw the transmission station: London. He read:

"Don't ever try to see me again. Your suspicions are entirely unfounded as you probably know by now. Pete and I to be married Monday. Colleen."

He sat down at the transmitter, punched out a message to American Express, coding it urgent for delivery to Colleen Lanai.

"Colleen: If you can't think of me, please think of what this means to a city full of people. Bring Pete and that machine back before it's too late. You can't be this inhuman."

He hesitated before signing it, punched out, "I love you." He signed it, "Eric."

He thought, *You damn' fool, Eric. After the way she ran out on you.*

He went into the kitchen, took a capsule to stave off weariness, ate a dinner of pills, drank a cup of coffee. He leaned back against the kitchen drainboard, waiting for the capsule to take hold. His head cleared; he washed his face in cold water, dried it, returned to the lab.

The front door announcer chimed at 6:42 p.m. The screen showed the clerk from the parts house, his arms gripping a bulky package. Eric punched the door release, spoke into the tube: "First door on your left, downstairs."

The back wall of his bench suddenly wavered, the lines of masonry rippling; a moment of disorientation surged through him. He bit his lip, holding to the reality of the pain.

It's too soon, he thought. *Probably my own nerves; I'm too tense.*

An idea on the nature of the Syndrome flashed into his mind. He pulled a scratch pad to him, scribbled, "Loss of unconscious autonomy; overstimulation subliminal receptors; gross perception—petit perception. Check C. G. Jung's collective unconscious."

Footsteps tapped down the stairway.

"This the place?"

The clerk was a taller man than he had expected. An air of near adolescent eagerness played across the man's features as he took in the lab. "What a layout!"

Eric cleared a space on the bench. "Put that stuff right here." Eric's eyes focused on the clerk's delicately sensitive hands. The man slid the box onto the bench, picked up a fixed crystal oscillator from beside the box, examined it.

"Do you know anything about electronic hookups?" Eric asked.

The clerk looked up, grinned. "W7CGO. I've had my own ham station over ten years."

Eric offered his hand. "I'm Dr. Eric Ladde."

"Baldwin Platte . . . Baldy." He ran one of his sensitive hands through thinning hair.

"Glad to know you, Baldy. How'd you like to make a thousand bucks over what I've already promised you?"

"Are you kidding, Doc?"

Eric turned his head, looked at the framework of the teleprobe. "If that thing isn't finished and ready to go by four o'clock tomorrow afternoon, Seattle will go the way of Los Angeles."

Baldy's eyes widened; he looked at the framework. "The Syndrome? How can—"

"I've discovered what caused the Syndrome . . . a machine like this. I have to build a copy of that machine and get it working. Otherwise—"

The clerk's eyes were clear, sober. "I saw your nameplate upstairs, Doc, and remembered I'd read about you."

"Well?"

"If you say positive you've found out what caused the Syndrome, I'll take your word for it. Just don't try to explain it to me." He looked toward the parts on the bench, back to the teleprobe. "Tell me what I'm supposed to do." A pause. "And I hope you know what you're talking about."

"I've found something that just can't be coincidence," Eric said. "Added to what I know about teleprobes, well—" He hesitated. "Yes, I know what I'm talking about."

Eric took a small bottle from the rear of his bench, looked at the label, shook out a capsule. "Here, take this; it'll keep you awake."

Baldy swallowed the capsule.

Eric sorted through the papers on his bench, found the first sheet. "Now, here's what we're dealing with. There's a tricky quarter-wave hookup coupled to an amplification factor that'll throw you back on your heels."

Baldy looked over Eric's shoulder. "Doesn't look too hard to follow. Let me work on that while you take over some of the tougher parts." He reached for the diagram, moved it to a cleared corner of the bench. "What's this thing supposed to do, Doc?"

"It creates a field of impulses which feed directly into the human unconscious. The field distorts—"

Baldy interrupted him. "O.K., Doc. I forgot I asked you not to explain it to me." He looked up, smiled. "I flunked Sociology." His expression sobered. "I'll just work on the assumption you know what this is all about. Electronics I understand; psychology . . . no."

They worked in silence, broken only by sparse questions, muttering. The second hand on the wall clock moved around, around, around; the minute hand followed, and the hour hand.

At 8:00 a.m., they sent out for breakfast. The layout of the crystal oscillators still puzzled them. Much of the diagram was scrawled in a radio shorthand.

Baldy made the first break in the puzzle.

"Doc, are these things supposed to make a noise?"

Eric looked at the diagram. "What?" His eyes widened. "Of course they're supposed to make a noise."

Baldy wet his lips with his tongue. "There's a special sonar crystal set for depth sounding in submarine detection. This looks faintly like the circuit, but there are some weird changes."

Eric tugged at his lip; his eyes glistened. "That's it! That's why there's no control circuit! That's why it looks as though these things would hunt all over the place! The operator is the control—his mind keeps it in balance!"

"How's that?"

Eric ignored the question. "But this means we have the wrong kind of crystals. We've misreading the parts list." Frustration sagged his shoulders. "And we're not even halfway finished."

Baldy tapped the diagram with a finger. "Doc, I've got some old surplus sonar equipment at home. I'll call my wife and have her bring it over. I think there are six or seven sonopulsators—they just might work."

Eric looked at the wall clock: 8:28 a.m. Seven and a half hours to go. "Tell her to hurry."

Mrs. "Baldy" was a female version

of her husband. She carried a heavy wooden box down the steps, balancing it with an easy nonchalance.

"Hi, Hon. Where'll I put this stuff?"

"On the floor . . . anywhere. Doc, this is Betty."

"How do you do."

"Hiya, Doc. There's some more stuff in the car. I'll get it."

Baldy took her arm. "You better let me do it. You shouldn't be carrying heavy loads, especially down stairs."

She pulled away. "Go on. Get back to your work. This is good for me—I need the exercise."

"But—"

"But me no buts." She pushed him.

He returned to the bench reluctantly, looking back at his wife. She turned at the doorway and looked at Baldy. "You look pretty good for being up all night, Hon. What's all the rush?"

"I'll explain later. You better get that stuff."

Baldy turned to the box she had brought, began sorting through it. "Here they are." He lifted out two small plastic cases, handed them to Eric, pulled out another, another. There were eight of them. They lined the cases up on the bench. Baldy snapped open the cover of the first one.

"They're mostly printed circuits, crystal diode transistors and a few tubes. Wonderful engineering. Don't know what the dickens I ever planned to do with them. Couldn't resist the bargain. They were two bucks apiece." He folded back the side plate. "Here's the crys—Doc!"

Eric bent over the case.

Baldy reached into the case. "What were those tubes you wanted?"

Eric grabbed the circuit diagram, ran his finger down the parts list. "C6 midget variable, C7, C8 dual, 4ufd."

Baldy pulled out a tube. "There's your C6." He pulled out another. "There's your C8." Another. "Your C7." He peered into the works. "There's a third stage in here I don't think'll do us any good. We can rig a substitute for the 4ufd component."

Baldy whistled tonelessly through his teeth. "No wonder that diagram looked familiar. It was based on this wartime circuit."

Eric felt a moment of exultation, sobered when he looked at the wall clock: 9:04 a.m.

He thought, "We have to work faster or we'll never make it in time. Less than seven hours to go."

He said, "Let's get busy. We haven't much time."

Betty came down the stairs with another box. "You guys eaten?"

Baldy didn't look up from dismantling the second plastic box. "Yeah, but you might make us some sandwiches for later."

Eric looked up from another of the plastic boxes. "Cupboard upstairs is full of food."

Betty turned, clattered up the stairs.

Baldy glanced at Eric out of the corners of his eyes. "Doc, don't say anything to Betty about the reason for all this." He turned his attention back to the box, working methodically. "We're expecting our first son in about five months." He took a deep breath. "You've got me convinced." A drop of perspiration ran down his nose, fell onto his hand. He wiped his hand on his shirt. "This has gotta work."

Betty's voice echoed down the stairs: "Hey, Doc, where's your can opener?"

Eric had his head and shoulders inside the teleprobe. He pulled back, shouted, "Motor-punch to the left of the sink."

Muttering, grumbling, clinking noises echoed down from the kitchen. Presently, Betty appeared with a plate of sandwiches, a red-tinted bandage on her left thumb. "Broke your paring knife," she said. "Those mechanical gadgets scare me." She looked fondly at her husband's back. "He's just as gadget happy as you are, Doc. If I didn't watch him like a spy-beam my nice old kitchen would be an electronic nightmare." She upended an empty box, put the plate of sandwiches on it. "Eat when you get hungry. Anything I can do?"

Baldy stepped back from the bench, turned. "Why don't you go over to Mom's for the day?"

"The whole day?"

Baldy glanced at Eric, back at his wife. "The Doc's paying me fourteen hundred bucks for the day's work. That's our baby money; now run along."

She made as though to speak, closed her mouth, walked over to her husband, kissed his cheek. "O.K., Hon. Bye." She left.

Eric and Baldy went on with their work, the pressure mounting with each clock tick. They plodded ahead, methodically checking each step.

At 3:20 p.m., Baldy released test clips from half of the new resonance circuit, glanced at the wall clock. He stopped, looked back at the teleprobe, weighing the work yet to be done. Eric lay on his back under the machine, soldering a string of new connections.

"Doc, we aren't going to make it." He put the test meter on the bench, leaned against the bench. "There just isn't enough time."

An electronic soldering iron skidded out from under the teleprobe. Eric squirmed out behind it, looked up at the clock, back at the unconnected wires of the crystal circuits. He stood up, fished a credit book from his pocket, wrote out a fourteen hundred buck credit check to Baldwin Platte. He tore out the check, handed it to Baldy.

"You've earned every cent of this, Baldy. Now beat it; go join your wife."

"But—"

"We haven't time to argue. Lock the door after you so you can't get back in if—"

Baldy raised his right hand, dropped it. "Doc, I can't—"

"It's all right, Baldy." Eric took a deep breath. "I kind of know how I'll go if I'm too late." He stared at Baldy. "I don't know about you. You might, well—" He shrugged.

Baldy nodded, swallowed. "I guess you're right, Doc." His lips worked. Abruptly, he turned, ran up the stairs. The outside door slammed.

Eric turned back to the teleprobe, picked up an open lead to the crystal circuits, matched it to its receptor, ran a drop of solder across the connection. He moved to the next crystal unit, the next—

At one minute to four he looked at the clock. More than an hour's work remained on the teleprobe and then—He didn't know. He leaned back against the bench, eyes filmed by fatigue. He pulled a cigarette from his pocket, pressed the igniter, took a deep drag. He remembered Colleen's question: "What's it like to be insane?" He stared at the ember on his cigarette.

Will I tear the teleprobe apart? Will I take a gun, go hunting for Colleen and Pete? Will I run out— The clock behind him clicked. He tensed. *What will it be like?* He felt dizzy, nauseated. A wave of melancholia smothered his emotions. Tears of self-pity started in his eyes. He gritted his teeth. *I'm not insane . . . I'm not insane*— He dug his fingernails into his palms, drew in deep, shuddering breaths. Uncertain thoughts wandered through

his mind.

I shall faint . . . the incoherence of morosis . . . demoniacal possession . . . dithyrambic dizziness . . . an anima figure concretionized out of the libido . . . corybantic calenture . . . mad as a March hare—

His head sagged forward.

. . . Non compos mentis . . . aliéné . . . avoir le diable au corps— What has happened to Seattle? What has happened to Seattle? What has— His breathing steadied; he blinked his eyes. Everything appeared unchanged . . . unchanged . . . unchanged—

I'm wandering. I must get hold of myself!

The fingers of his right hand burned. He shook away the short ember of his cigarette.

Was I wrong? What's happening outside?" He started for the stairs, made it halfway to the door when the lights went out. A tight band ringed his chest. Eric felt his way to the door, grasped the stair rail, climbed up to the dim, filtered light of the hall. He stared at the stained glass bricks beside the door, tensed at a burst of gunshots from outside. He sleepwalked to the kitchen, raised on tiptoes to look through the ventilator window over the sink.

People! The street swarmed with people—some running, some walking purposefully, some wandering without aim, some clothed, some partly clothed, some nude. The bodies of a man and child sprawled in blood at the opposite curbing.

He shook his head, turned, went into the living room. The lights suddenly flashed on, off, on, stayed. He punched video for a news program, got only wavy lines. He put the set on manual, dialed a Tacoma station. Again wavy lines.

Olympia was on the air, a newscaster reading a weather report: "Partly cloudy with showers by tomorrow afternoon. Temperatures—"

A hand carrying a sheet of paper reached into the speaker's field of vision. The newsman stopped, scanned the paper. His hand shook. "Attention! Our mobile unit at the Clyde Field jet races reports that the Scramble Syndrome has struck the twin cities of Seattle-Tacoma. More than three million people are reported infected. Emergency measures already are being taken. Road blocks are being set up. There are known to have been fatalities, but—"

A new sheet of paper was handed to the announcer. His jaw muscles twitched as he read. "A jet racer has crashed into the crowd at Clyde Field. The death toll is estimated at three hundred. There are no available medical facilities. All doctors listening to this broadcast—all doctors—report at once to State disaster headquarters. Emergency medical—" The lights again blinked out, the screen faded.

Eric hesitated. *I'm a doctor. Shall I go outside and do what I can, medically, or shall I go down and finish the*

teleprobe—now that I've been proved right? Would it do any good if I did get it working? He found himself breathing in a deep rhythm. *Why haven't I been affected?* He paused. *Or am I crazed like all the others? Am I really doing what I think I'm doing? Am I mad and dreaming a reality?* He thought of pinching himself, knew that would be no proof. *I have to go ahead as though I'm sane. Anything else* really *is madness.*

He chose the teleprobe, located a handlight in his bedroom, returned to the basement lab. He found the long unused emergency generator under the crates in the corner. He wheeled it to the center of the lab, examined it. The powerful alcohol turbine appeared in working order. The pressure cap on the fuel reservoir popped as he released it. The reservoir was more than half full. He found two carboys of alcohol fuel in the corner where the generator had been stored. He filled the fuel tank, replaced the cap, pumped pressure into the tank.

The generator's power lead he plugged into the lab fuse box. The hand igniter caught on the first spin. The turbine whirred to life, keened up through the sonic range. Lab lights sprang to life, dimmed, steadied as the relays adjusted.

It was 7:22 p.m. by the wall clock when he soldered the final connection. Eric estimated a half hour delay before the little generator had taken over, put the time actually at near eight o'clock. He found himself hesitant, strangely unwilling to test the completed machine. His one-time encephalorecorder was a weird maze of crossed wiring, emergency shielding, crowded tubes, crystals. The only familiar thing remaining in the tubular framework was the half-dome of the head-contact hanging above the test chair.

Eric plugged in a power line, linked it to a portable switchbox which he placed in the machine beside the chair. He eased aside a sheaf of wires, wormed his way through, sat down in the chair. He hesitated, hand on the switch.

Am I really sitting here? he wondered. *Or is this some trick of the unconscious mind? Perhaps I'm in a corner somewhere with a thumb in my mouth. Maybe I've torn the teleprobe apart. Maybe I've put the teleprobe together so it will kill me the instant I close the switch.*

He looked down at the switch, withdrew his hand. He thought, *I can't just sit here; that's madness, too.*

He reached up to the helmetlike dome, brought it down over his head. He felt the pinpricks of the contacts as they probed through his hair to his scalp. The narco-needles took hold, deadening skin sensation.

This feels like reality, he thought. *But maybe I'm building this out of memory. It's hardly likely I'm the only sane person in the city.* He lowered his hand to the switch. *But I have to act*

as though I am.

Almost of its own volition, his thumb moved, depressed the switch. Instantly, a soft ululation hung in the laboratory air. It shifted to dissonance, to harmony, wailing, half-forgotten music, wavered up the scale, down the scale.

In Eric's mind, mottled pictures of insanity threatened to overwhelm his consciousness. He sank into a maelstrom. A brilliant spectrograph coruscated before his eyes. In a tiny corner of his awareness, a discrete pattern of sensation remained, a reality to hold onto, to save him—the feeling of the teleprobe's chair beneath him and against his back.

He sank farther into the maelstrom, saw it change to gray, become suddenly a tiny picture seen through the wrong end of a telescope. He saw a small boy holding the hand of a woman in a black dress. The two went into a hall-like room. Abruptly Eric no longer saw them from a distance but was again himself at age nine walking toward a casket. He sensed again the horrified fascination, heard his mother's sobs, the murmurous, meaningless voice sounds of a tall, thin undertaker. Then, there was the casket and in it a pale, waxed creature who looked somewhat like his father. As Eric watched, the face melted and became the face of his uncle Mark; and then another mask, his high-school geometry teacher. Eric thought, *We missed that one in my psychoanalysis.* He watched the mobile face in the coffin as it again shifted and became the professor who had taught him abnormal psychology, and then his own analyst, Dr. Lincoln Ordway, and then—he fought against this one—Dr. Carlos Amanti.

So that's the father image I've held all these years, he thought. *That means — That means I've never really given up searching for my father. A fine thing for an analyst to discover about himself!* He hesitated. *Why did I have to recognize that? I wonder if Pete went through this in his musikron?* Another part of his mind said, *Of course not. A person has to want to see inside himself or he never will, even if he has the opportunity.*

The other part of his mind abruptly seemed to reach up, seize control of his consciousness. His awareness of self lurched aside, became transformed into a mote whipping through his memories so rapidly he could barely distinguish between events.

Am I dying? he wondered. *Is it my life passing in review?*

The kaleidoscopic progression jerked to a stop before a vision of Colleen—the way he had seen her in his dream. The memory screen lurched to Pete. He saw the two people in a relationship to himself that he had never quite understood. They represented a catalyst, not good or evil, merely a reagent which set events in motion.

Suddenly, Eric sensed his awareness

growing, permeating his body. He knew the condition and action of each gland, each muscle fiber, each nerve ending. He focused his inner eye on the grayness through which he had passed. Into the gray came a tendril of red—shifting, twisting, weaving past him. He followed the red line. A picture formed in his mind, growing there like the awakening from anaesthetic. He looked down a long street—dim in the spring dusk—at the lights of a jet car thundering toward him. The car grew larger, larger, the lights two hypnotic eyes. With the vision came a thought: *My, that's pretty!*

Involuntary reactions took over. He sensed muscles tensing, jumping aside, the hot blast of the jet car as it passed. A plaintive thought twisted into his mind: *Where am I? Where's Mama? Where's Bea?*

Tightness gripped Eric's stomach as he realized he sat in another's consciousness, saw through another's eyes, sensed through another's nerves. He jumped away from the experience, pulling out of the other mind as though he had touched a hot stove.

So that's how Pete knew so much, he thought. *Pete sat in his musikron and looked through our eyes.* Another thought: *What am I doing here?* He sensed the teleprobe chair beneath him, heard the new self within him say, I'm going to need more trained, expert help."

He followed another red tendril, searching, discarded it; sought another. The orientation was peculiar — no precise up or down or compass points until he looked out of the other eyes. He came to rest finally behind two eyes that looked down from an open window in the fortieth story of an office building, sensed the suicidal thoughts building up pressure within this person. Gently, Eric touched the center of consciousness, seeking the name—Dr. Lincoln Ordway, psychoanalyst.

Eric thought, *Even now I turn back to my own analyst.*

Tensely, Eric retreated to a lower level of the other's consciousness, knowing that the slightest misstep would precipitate this man's death wish, a jump through that window. The lower levels suddenly erupted a pinwheel of coruscating purple light. The pinwheel slowed, became a mandala figure—at the four points of the figure an open window, a coffin, a transitus-tree and a human face which Eric suddenly recognized as a distorted picture of himself. The face was boyish, slightly vacant.

Eric thought, *The analyst, too, is tied to what he believes is his patient.* With the thought, he willed himself to move gently, unobtrusively into the image of himself, began to expand his area of dominion over the other's unconscious. He pushed a tentative thought against the almost palpable wall which represented Dr. Ordway's focus of consciousness: *Linc* (a whisper), *don't jump. Do you hear me, Linc? Don't*

jump. The city needs your help.

With part of his mind, Eric realized that if the analyst sensed his mental privacy being invaded that realization could tip the balance, send the man plunging out the window. Another part of Eric's mind took that moment to render up a solution to why he needed this man and others like him: The patterns of insanity broadcast by Pete Serantis could only be counterbalanced by a rebroadcast of calmness and sanity.

Eric tensed, withdrew slightly as he felt the analyst move closer to the window. In the other's mind, he whispered, "Come away from the window. Come away—" Resistance! A white light expanded in Eric's thoughts, rejected him. He felt himself swimming out into the gray maelstrom, receding. A red tendril approached and with it a question, not of his own origin, lifted into his mind:

Eric? What is this thing?

Eric allowed the pattern of teleprobe development to siphon through his mind. He ended the pattern with an explanation of what was needed.

Thought: *Eric, how did the Syndrome miss you?*

Conditioning by long exposure to my own teleprobe; high resistance to unconscious distortion built up by that work.

Funny thing; I was about to dive out the window when I sensed your interference. It was something—the red tendril moved closer—*like this.*

They meshed completely.

"What now?" asked Dr. Ordway.

"We'll need as much trained help as we can find in the city. Others would censor out this experience below the threshold of consciousness."

"The influence of your teleprobe may quiet everybody."

"Yes, but if the machine is ever turned off, or if people go beyond its area of influence, they'd be back in the soup."

"We'll have to go in the back door of every unconscious in the city and put things in order!"

"Not just *this* city; every city where the musikron has been and every city where Serantis takes it until we can stop him."

"How did the musikron do this thing?"

Eric projected a mixed pattern of concepts and pictures: "The musikron pushed us deep down into the collective unconscious, dangled us there as long as we remained within its area of influence. (Picture of rope hanging down into swirls of fog.) Then the musikron was turned off. (Picture of knife cutting the rope, the end falling, falling into a swirling gray maelstrom.) Do you see it?"

"If we have to go down into that maelstrom after all these people, hadn't we better get started?"

He was a short man digging with his fingers in the soft loam of his flowerbed, staring vacantly at shredded leaves—name, Dr. Harold Marsh,

psychologist. Unobtrusively, softly, they absorbed him into the network of the teleprobe.

She was a woman, dressed in a thin housecoat, preparing to leap from the end of a pier—name, Lois Voorhies, lay analyst. Swiftly, they drew her back to sanity.

Eric paused to follow a thin red tendril to the mind of a neighbor, saw through the other's eyes sanity returning around him.

Like ripples spreading in a pond, a semblance of sanity washed out across the city. Electric power returned; emergency services were restored.

The eyes of a clinical psychologist east of the city transmitted a view of a jet plane arrowing toward Clyde Field. Through the psychologist's mind the network picked up the radiating thought patterns of a woman—guilt, remorse, despair.

Colleen!

Hesitantly, the network extended a pseudopod of thought, reached into Colleen's consciousness and found terror. *What is happening to me?*

Eric took over. *Colleen, don't be afraid. This is Eric. We are getting things back in order thanks to you and the musikron plans.* He projected the pattern of their accomplishments.

I don't understand. You're—

You don't have to understand now. Hesitantly: *I'm glad you came.*

Eric, I came as soon as I heard—when I realized you were right about Pete and the musikron. She paused. *We're coming down to land.*

Colleen's chartered plane settled onto the runway, rolled up to a hangar and was surrounded by National Guardsmen.

She sent out a thought: *We have to do something about London. Pete threatened to smash the musikron, to commit suicide. He tried to keep me there by force.*

When?

Six hours ago.

Has it been that long since the Syndrome hit?

The network moved in: *What is the nature of this man Serantis?*

Colleen and Eric merged thoughts to project Pete's personality.

The network: *He'll not commit suicide, or smash his machine. Too self-centered. He'll go into hiding. We'll find him soon enough when we need him—unless he's lynched first.*

Colleen interrupted: *This National Guard major won't let me leave the airport.*

Tell him you're a nurse assigned to Maynard Hospital.

Individual thought from the network: *I'll confirm from this end.*

Eric: *Hurry . . . darling. We need all of the help we can get from people resistant to the teleprobe.*

Thoughts from the network: *That's as good a rationalization as any. Every man to his own type of insanity. That's enough nonsense—let's get to work!*

THE END

THE PARADOXES

BY CRISPIN KIM BRADLEY

When a gas company pipes out their gas, they add something that makes a loud stink. It doesn't help the burning—it's effective in warning when there's a leak. Ever think of logical paradoxes as serving a similar purpose?

In 1903 the eminent German logician, Gottlob Frege, had just concluded after ten years the second volume of his "*Grundgesetze der Arithmetik*," a monumental work which proposed to place mathematics for the first time on a rigorous logical basis. Frege was still arranging last minute details with his publisher when he received a letter from Bertrand Russell who was engaged in similar work in England. In this letter Russell mentioned a peculiar paradox he happened to encounter while he was attempting to prove certain theorems in the theory of sets.

To the casual observer Russell's paradox would appear to be an amusing, but insignificant, little parlor game. In fact Russell himself in later years turned the content of his paradox into a story about a small-town barber who shaved all those citizens of the town, and only those, who did not shave themselves. The joke came in when you considered the question: Did the barber shave himself? Either answer, of course, would violate the barber's rule.

The original version of the paradox — the one contained in the letter to Frege — had to do with the concept of a "set" or "class" of objects or entities. The set of all even numbers is an example. Russell considered the obvious fact that many ordinary sets don't contain themselves as members, whereas some exceptional sets do contain themselves. Thus the set of all abstract ideas is itself an abstract

idea, and therefore this set *does* contain itself as a member. But this is exceptional. If we examine an ordinary set, such as the set of all British farmers, we find that the set is *not* a member of itself, for the set mentioned is obviously not a British farmer.

Suppose, said Russell, we mentally collect all the ordinary sets — those which *don't* contain themselves — and form a new set with these ordinary sets as members. We might call it "the set of all sets which don't contain themselves." The question now arises, does this new set contain itself or not? The amazing and disconcerting fact that Russell discovered is that neither answer is tenable. If we assume that the new set contains itself, then it must be an ordinary set, since it contains only ordinary sets. But no ordinary set contains itself! Contrarily, if we suppose that this new set does not contain itself, then it must be one of those exceptional sets which *do* contain themselves!

Now most of us would regard this as an amusing case of philosophical hair-splitting and let it go at that. To Frege, however, the paradox was of tremendous significance. In fact to him it spelled disaster. It meant that his life's work, at the very moment when he believed it to be complete, was on the verge of total destruction. He was placed in the heart-rending position of having to go back and reconstruct the work of years, or abandoning the work altogether. In one of the greatest understatements of all time he acknowledged Russell's communication in an appendix to his book as follows:

"A scientist can hardly meet with anything more undesirable than to have the foundations give way just as the work is finished. In this position I was put by a letter from Mr. Bertrand Russell as the work was nearly through the press."

To appreciate the reason why Frege — and, later, other logicians — viewed Russell's discovery with such concern, we must consider the position which the deductive sciences, logic and mathematics, hold in the heirarchy of the sciences. The permanence and necessity of the laws of the various sciences admits of many gradations. Thus a social scientist — an economist for example — would hardly hesitate to execute the most drastic revisions in his theories should observation of social phenomena indicate the need for revision.

A biologist, on the other hand, would revise his theories with somewhat greater reluctance. He would look twice to see what he could salvage of his old theories. And if the weight of discrepant observations is sufficiently great to preclude his adherence to these theories, he might be inclined to make the smallest revision possible to bring his theories in accord with the facts. A physical scientist might cling to his theories with even greater

tenacity. The number and degree of experimental and observational discrepancies would have to be nearly overwhelming before he would be inclined to budge. But when a revision is made it is apt to be more far reaching — relativity and quantum theory are cases in point.

At the very core of our conceptual scheme stand such disciplines as logic and mathematics, the laws of which are felt to enjoy a necessity and inevitability decidedly greater than those of the natural sciences. When some revision of our system of scientific thought is called for, we prefer, other things being equal, a revision which disturbs the system least. Hence the deductive sciences, central as they are to our conceptual scheme, tend to be accorded the greatest immunity to such revision.

Now Russell's paradox called to the attention of logicians a defect in the structure of scientific thought. It revealed a flaw in logic itself. It pointed to a need for revision which could not help but have its effects, however slight, throughout the whole structure of science.

The gravity of the situation might best be illustrated by analogy. Suppose it were suddenly learned that ordinary language, no matter how carefully employed, was inadequate for the uses to which it is put. Suppose even the most carefully drawn up legal documents — from your insurance policy to the Constitution of the United States — were rendered worthless by the discovery of hidden flaws and loopholes. Such a state of affairs might very well result in social chaos.

Now the interesting thing is that the mathematician Herman Weyl has succeeded in transforming Russell's paradox in logic into a paradox in the grammar of ordinary language. Fortunately this new paradox is not of the world-shaking kind envisioned above, but nevertheless the mere possibility of constructing such a paradox is somewhat disquieting. There is a certain kinship between grammar and logic — the grammar of a language is, in a sense, a reflection of the logic of the users of that language — and Weyl was able to utilize this kinship in the construction of his paradox.

Certain adjectives, Weyl reasoned, are self-descriptive. For example the adjective "short" is a short word. Other examples are "old," "single," "English," "polysyllabic," et cetera. But most adjectives, such as "long," "new," "hyphenated," "German," and "monosyllabic," are non-self-descriptive. Thus "long" is not a long word. Consider now the adjective "non-self-descriptive." In which category does it belong? A moment's reflection will reveal that it can be neither self-descriptive nor non-self-descriptive. But the two categories exhaust all possibilities so that it *must* be one or the other. Thus we are faced with the same sort of dilemma

in grammar as that discovered by Russell in logic.

Russell's paradox was merely the first of a long list which cropped up in the deductive sciences since the turn of the century. In addition to Russell's and Weyl's there are paradoxes due to Berry, Richard, Burali-Forti, Grelling, König, Skolem, Kleene and Rosser, et cetera, a few of which we will examine in this article. The situation was somewhat appalling. For prior to the advent of the paradoxes, mathematicians and logicians complacently assumed that their subjects of study rested on unshakable foundations, free of contradiction. The discovery of the paradoxes burst like a bombshell on this quiescent scene. These lofty sciences suddenly discovvered that their foundations were built on sand. They found themselves in the same state of unstable equilibrium as the inhabitants of that hypothetical island who made a precarious living by taking in each other's wash.

The presence of the paradoxes raises the question as to whether the whole structure of scientific knowledge is just a gigantic hoax. This possibility looms as a remote but ever-present shadow in the background of our scientific endeavors. Most scientists, of course, are convinced that our sciences are built on a core of essential truth, for it would be difficult otherwise to account for the remarkable success of the sciences. But might not that success be merely a case of drawing correct conclusions from incorrect premises?

Considerations such as these have in recent years given impetus to the study and re-examination of the foundations of our scientific knowledge. In mathematics and logic this has taken the form of attempts to set up these disciplines on some axiomatic basis which can be shown to be free from contradiction. It has given rise to the new science of metamathematics. While little success has been attained toward the goal of proving the consistency of mathematics — indeed, Gödel's results seem to preclude the possibility of ever attaining this goal — there have been notable gains in the clarification of fundamental concepts and the introduction of rigor where vagueness had prevailed.

The appearance of the paradoxes is not an entirely new phenomenon in the history of human thought, although it is only comparatively recently that they have been studied with any great intensity. Some of the logical and mathematical paradoxes had their origins in Greek antiquity. The oldest known paradox — the paradox of the Liar, or the Epimenides Paradox — still commands the attention of modern logicians. This particular paradox formed the basis of the short story "The Monkey Wrench," by Gordon R. Dickson, which appeared in ASF, August 1951. Epi-

menides, the Cretan, once said "All Cretans always lie." Supposedly, all other statements made by Cretans were known to be lies. Now if his statement were true, then the Cretan Epimenides spoke the truth for once, and Cretans do not always lie, so the statement is really false. Conversely, if the statement were false, then *all* statements made by Cretans are false, so that the statement made by Epimenides was true, after all.

The Greeks are reputed to have invented mathematics and logic — the first piece of deductive reasoning in the history of mankind is traditionally accredited to the half-legendary philosopher Thales — and they took a particular delight in confounding their intellectual adversaries with the construction of clever and subtle paradoxes. In the fifth century B.C., a self-taught country boy, Zeno of Elea, visited the learned philosophers of Athens and shocked them out of their complacency by inventing four innocent-looking riddles which they were powerless to solve. The best known of the four is the problem of Achilles and the tortoise. Zeno proceeded to prove that if Achilles were running a race with a tortoise, and the tortoise were given a head start, then Achilles could never overtake the tortoise no matter how fast he ran. For, reasoned Zeno, before Achilles could overtake the tortoise he must first run to the point at which the tortoise started. By that time the tortoise will have moved a little ahead. Achilles must now run the intervening distance. And the tortoise will have moved ahead again, and so *ad infinitum.*

The resolution of Zeno's paradox took two thousand years. It had to await the development of a rigorous theory of infinite series which in turn depended upon a rigorous theory of irrational numbers. The theory of irrational numbers was started by Eudoxus in the fourth century B.C. and was completed — to the satisfaction of most, but not all, mathematicians — only in modern times by Cauchy, Weirstrass, Cantor, Dedekind, and the present-day symbolic logicians. So the "innocent" riddles of the country bumpkin Zeno involved mathematicians in a two-thousand-year-old struggle which perhaps is not yet over.

When Russell and Whitehead were writing their monumental classic in symbolic logic, the "*Principia Mathematica,*" they included a discussion of a paradox suggested by Mr. G. G. Berry of the Bodleian Library of Oxford which has since become famous as "Berry's Paradox." The cleverest variant of this paradox which has come to my attention is one by Professor Max Black of Cornell University. It runs as follows: An examination of the contents of this magazine should reveal to the reader that some integers are mentioned while others are not. The integers may be mentioned by the corresponding cipher

— the number at the bottom of this page for instance — or by a name such as "two," or by a descriptive phrase such as "the smallest even number." Only a finite number of integers can be mentioned by this magazine in these ways for the number of words in this magazine is limited. So there are plenty of integers not mentioned in this magazine; an infinite number of them in fact. Consider now *the smallest integer which is not mentioned in this magazine.* This phrase defines or describes just one integer, hence that integer has just been mentioned in this magazine by the italicized phrase. Here then we have the paradox of a number which is both mentioned and not mentioned.

It should perhaps, be emphasized once again that the paradoxes are not foolish questions with which the philosophically minded while away their time. When, at the beginning of the present century, Russell, Burali-Forti, Richard and others came forth with their paradoxes, they started a revolution in the mathematical world which is still very much in progress. Attempts to eliminate these paradoxes have provided a powerful stimulus to the development of symbolic logic, metamathematics, and certain branches of mathematics.

Among the most notable of the attempts to eliminate the paradoxes is Russell's famous "Theory of Types." Russell noted certain features which are common to many of the paradoxes. Many of them deal with *all* of a certain type of entity — the class of *all* classes, *all* Cretans, *all* integers, et cetera. Also many of them have the characteristic of *self-reference* — classes which contain *themselves*, barbers who shave *themselves*, et cetera. Russell's theory is essentially a set of rules designed to distribute various entities into a hierarchy of "types" in such a way as to prevent self-reference. For example, individuals are said to constitute one type of entity, classes of individuals a higher type, classes of classes of individuals a still higher type, and so on. The rules forbid miscegenation of these types. Thus "the class of all classes" is ruled out as an illegitimate concept because of an inherent ambiguity as to the "type" of the classes referred to.

The influence of the paradoxes has not been confined to the deductive sciences, mathematics and logic; the physical sciences have felt their influence perhaps just as profoundly. Indeed the two basic segments of modern physics, quantum theory and relativity theory, might be said to have arisen as a direct result of the paradoxes engendered by the old classical physics.

The story of the development of these theories is well known to many readers of science fiction but a brief recapitulation may be in order here:

Classical physics met its chief suc-

cess in mechanics — particularly celestial mechanics. The Newtonian system worked so perfectly that it lulled the minds of nineteenth and early twentieth century physicists and astronomers into a false complacency. But there were several thorns in their sides — one was the peculiar motion of the planet Mercury which refused to obey Newtonian laws in its wanderings about the Sun. Mercury did move in an ellipse as all well-behaved planets should, but the trouble was that the elliptic orbit itself insisted on precessing around the Sun in inexplicable fashion. All sorts of *ad hoc* theories were advanced to account for this — such as the hypothetical planet Vulcan which was supposed to follow an orbit between Mercury and the Sun — but no such contrived theory was successful. It was not until Einstein replaced the Newtonian inverse-square law of gravitation by the new law — the vanishing of the first contraction of the curvature tensor in free space — that the mystery was resolved.

An even more glaring paradox appeared in optics. Certain observations such as the astronomical phenomenon of the aberration of light, seemed to indicate the existence of an absolute space, or "ether," through which the Earth and other planets plowed in their wanderings about the Sun. This was substantiated by the fact that the observer's velocity v appeared explicity in the electromagnetic equations which governed optical phenomena. But the famous Michelson-Morley experiments failed to detect any such velocity relative to an absolute ether. How could the two sets of phenomena be reconciled? This was accomplished when relativity theory replaced the Gallilean-Newtonian conception of absolute motion by the Fitzgerald-Lorentz transformations.

The development of quantum theory was more gradual and less spectacular than that of relativity theory but the results have proven to be just as revolutionary in character. This theory had its inception in the inability of the old classical thermodynamics to reconcile a certain paradox connected with radiation issuing from a hole in a wall, or from a perfect "black body." One theory due to Wien could predict the distribution of the short wavelength radiation fairly well, but an entirely different theory, the Rayleigh-Jeans, was necessary to determine the long wavelength radiation. How could the two be reconciled? Max Plank accomplished the task by introducing the idea that an oscillator, i.e. a vibrating object such as a steel spring, could vibrate in only certain discrete possible energy states, and not with a continuum of energies as classical physics presupposed.

Quantum theory was also successful in reconciling the greatest paradox of classical physics, that of the dual nature of light. Such phenomena as the

photoelectric effect pointed to a corpuscular nature, but interference phenomena could only be explained on a wave-theory basis. Only the introduction of probabilistic notions via the quantum theory was able to reconcile the two types of phenomena.

No article on paradoxes would be complete without some mention of the pseudo-paradoxes — those apparent contradictions which seemingly run counter to our intuitions but which are actually not contradictions at all. Relativity theory is noteworthy in this respect. In its early days many dyed-in-the-wool physicists refused to accept relativity theory on the grounds that its results were contrary to common sense. But "common sense" has since been repeatedly shown to be another name for our conceptual prejudices acquired through faulty upbringing. To a man raised on the Fitzgerald-Lorentz transformations there would be no element of mystery in the fact that two objects moving in opposite directions with speeds close to the velocity of light relative to the starting point would still, relative to each other, be traveling at a speed less that that of light. To those of us raised on Newtonian preconceptions, however, there always will linger a faint feeling of unreality about the whole situation.

Perhaps the most astounding of all pseudo-paradoxes is a recent mathematical result due to the two distinguished Polish mathematicians, Banach and Tarski. This result, reminiscent of the Biblical miracle of the loaves and fishes, although rigorous and unimpeachable, has proven almost as incredible for the mathematician as for the layman. Banach and Tarski have proven that a solid sphere can be decomposed into five parts which can be reassembled again in such a way as to form *two* solid spheres of the same size as the original. Further, a sphere the size of the Earth can be decomposed into a great many parts and then reassembled to form a sphere the size of a marble. Keep in mind that no contraction, distortion, or overlapping of the parts is assumed, just a rearrangement.

The process can, in theory, be worked backwards so that a sphere the size of a marble can be made to fill the space occupied by a sphere the size of the Earth or Sun. Or, pushing the process to its extreme, a sphere the size of a neutron can be made to pack the *entire universe* solidly, no vacant space remaining! The hitch — the spheres must be decomposed into so-called "non-measurable" parts, and there is at present no conceivable means of doing this.

THE END

GROWTH PROCESS

BY EDWARD GRENDON

***After three billion** years of getting used to Earth, Man's not adapted to Mars. Physically, pressure suits and the like can make up for that. For a mouse or a cow, that would be enough. But for a Man . . . is it?*

Illustrated by van Dongen

They had been gone a very long time. It had seemed endless to us as we sat in the instrument rooms, watching the tracking radar, drinking coffee, listening to the reports from the observatories that were following them. The clocks and calendars said it was only six days. The rest of the world would have agreed, but we knew better.

Officially the general carried all the responsibility and Riswald was used to it. A general learns to make decisions and bear the weight of them—so does a psychiatrist. But both of us were tense and worried. The trouble was that the entire top team felt deeply about the three boys we had sent off in their shining vehicle of steel and magnesium. We had gotten to know them too well.

The first time you do anything, it is especially difficult as you have no idea of the possible problems. And this was the first time men had ever left Earth. We could only speculate on what might happen to them.

Each of us had his own problems. Our biologist, Greenberg, had to make decisions about acceleration, body and organ integration under nongravity conditions, possible effects of cosmic rays and a dozen other factors. He had a team of bright young men to work with him and A. J. Carlson came down from Chicago every so often to advise and help, but the final decisions he had to make himself. Greenberg used to come into my office every now and then and tell

me how he was just guessing and didn't know half the real variables nor which were the important ones and how he wished he were back in college, teaching and experimenting with his tropical fish. After a while he would shake his head, grin, jokingly ask me what my fee was and go back to work.

The psychologists did their job well. Day after day they drilled their training into the men. Doing their job and returning became a basic and structural part of the personalities of the crew. Whatever happened to them, whatever situations they met or experiences they had, tremendous forces within themselves would urge them to finish their task by returning to the base. Even if these men were three fourths dead from exhaustion, cosmic rays or whatnot, they would bring their ship with its precious instruments back home.

My difficulty was that I was too close to the boys. You are a poor psychotherapist if you do not develop strong positive feelings towards your patients. You must like and respect them and wish them well. Each of them had been my patient as I probed and studied, strengthened the weak points in each personality and made sure that whatever they met, they would meet it as strongly as a man can and that their decisions would be on the basis of the facts and not on old unconscious memories.

It was all I could do. I cannot cure mental problems in advance and I had no idea if there would be any or of what kind. I was sure that it would be hard. I remembered in the old days in Vienna, Freud once told me: "The Earth, that is the deepest symbol of security. Here a man belongs. All his behavior is conditioned by the world he is born on. It is mother and home, father and older sibling, wife and son. It is the one mother who will never leave you and to whose womb you know you must return."

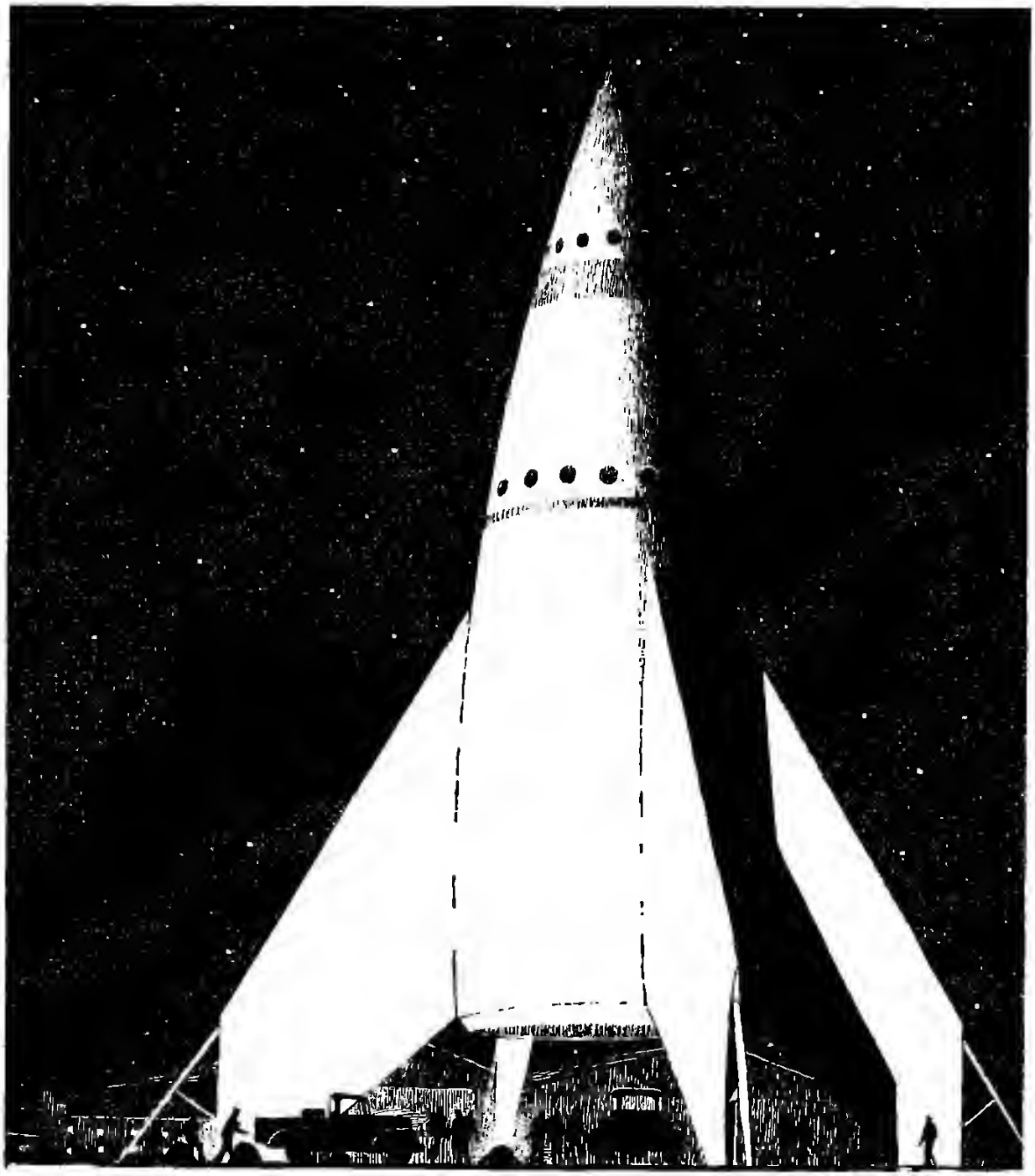
These young men were leaving her and the departure might mean nothing to them, or it might destroy them. They were tough and hard-trained and cynical, but it is a psychiatrist's job to know that there is a baby at the breast and a small crying child deep in each of us. I had strengthened them against the demands from within, but there is no armor that cannot be cracked. And who knew what weapons would be hurled at their minds and their bodies.

It was nearly over. The ship was coming in for a landing. The long flat dive turned into a "J" as the nose pointed up in a flare of rockets and she slowly settled down on her tail. The electrical charges that the ship had picked up made radio signals useless and as the rocket flames died away and we raced out to the ship—Riswald, Greenberg and I in the first jeep with the ambulance beside us—each of us

thought of different possibilities and few of them were pleasant.

Looking back at it now, as I sit peacefully here at my desk, I can still recapture the hopes and fears and tingle of blood, and my heart pounds in a way that my doctor assures me—as he did then—is very bad for the prognosis of any new books I hope to write.

Once we got out to the ship, we all looked rather silly. Riswald had told us again and again that the skin of the ship had to cool before the locks could



be opened and that even with the hoses this would take at least ten minutes. So we stood restlessly on the big platform that had trundled out behind us and that had raised us exactly thirty feet above the ground to the level of the shining, circular locks. The tank trucks played splashing streams of chemicals over the entire structure from rounded nose to flattened keel. We assayed conversation then gave it up and cursed ourselves and our sins of omission and commission whatever they might have been.

After what seemed a lot longer than ten minutes, Riswald signaled the ground crew. The hoses stopped bathing the ship, the platform moved forward and a technician opened the bolts and spun loose the lock. As it opened, we found ourselves looking into the passageway that led to the one big room that was all the living and working space that the ship provided.

I remember how quiet it was for a moment. There was a silence so great that it beat at your eardrums and screamed at your brain. And for a moment—a few seconds that made you comprehend fully the meaning of eternity—nothing happened.

Then we heard footsteps ringing on the metal passageway and one by one they came out. Alles in the lead, Sargent and Hartrik following. They were shaky, pale and worn, but they walked out of the passage smiling.

All three of us moved forward. And as we jostled each other and shook and reshook their hands and talked and laughed—with the hysterical tinge of discharging emotion in our laughter—and threw our arms around each other's shoulders, my happiness and relief were suddenly checked by an old familiar warning signal which began to tick away at the back of my mind.

There is a symptom in mental disease which cannot be described in words. All those who have had long experience with the emotionally ill know it well. It is a feeling one gets that the other person is somehow "away" from you. It often appears so early in the development that the other person may still be acting absolutely correctly for the situation—as were the three who had been in the rocket—but you know somehow that something is very wrong. We speak of the "glass wall" which you feel between yourself and the patient, but the words are inadequate. It is a response of your own unconscious to that of the other person and this kind of response cannot be communicated in language.

I must ask to be forgiven for what I did then although I think that no actions of mine would have made any difference in the final outcome. I ignored the warning of my carefully trained clinical intuition. I pretended it had never come. Even in the quick psychiatric interview I gave each of the boys that night after Greenberg's team had finished the medical check-

ups, I pretended I had seen nothing. And indeed, apart from the smallest trace of a "glass wall," there was nothing to observe. They told me of how they felt and of how hard the trip had been. They seemed, objectively speaking, well and healthy and I reported optimistically to Riswald.

The physicists and astronomers questioned them all next morning, correlating their observations with the instrument readings. Then for a space of two days they were allowed to rest and sleep.

While they rested, Riswald, Greenberg and I had a conference. Both of them were happy and relieved. Riswald said that the trip had fulfilled all hopes. We had excellent records of cosmic-ray activity in space and photographs of the other side of the Moon. We could build new rockets now and know that they would work. The plans for a Moon station could go ahead and Mars was not far off.

Greenberg told us that physically there had been no ill effects of the trip other than those one would expect from a six-day ordeal of extreme tension with very little sleep. When they looked at me for my findings, I said only that the boys appeared to be all right, but that I would know more later.

The full tests came on the third day after they had landed. From electroencephalographs to sputum analyses the medical section went over each of them in fine detail. My psychologists gave each of them projective tests and, with the aid of pentothal, I probed deeply into their minds. And I could no longer ignore the clinical understanding which Freud and Aichorn and Reik had trained so carefully.

Sometimes you see something clearly, but do not understand it at all. I have seen men who were without the most rudimentary trace of a conscience. Congenital deformities they were, but we have never understood how they came to be.

And so it was here. Slowly the schizophrenia developed in all of them. The psychologists had seen it subtly manifest itself in their tests, I had seen it in my interviews and gradually it became more obvious. Their conversations became disjointed, their responses less and less understandable. And I did not know what was causing it. Even when the three of them stayed in their rooms and only came out when strongly urged and had to be coaxed to eat, I did not know what had happened.

That the trip had done it was clear. But how and what and why? Until we found out and found a cure, man was bound to his home planet and could never leave it. The station became quiet and its personnel walked slowly and forlornly. Endless conferences discussed and dissected the problem. Solutions of all kinds were offered, but even those who suggested them knew that they were not valid. We called in

experts from every school of psychiatry, but they had nothing to offer. And for a space of three months, no progress was made.

Sargent was the one who finally gave me the clue. One day he wrote a note addressing it "To Whom It May Concern." The note was a simple request stating only:

"In the event of my death, my body is not to be cremated. Bury me deep in the earth."

When I saw the note I remembered what a very old and wise man had told me many years ago as we sat drinking coffee on the Ringstrasse in Vienna. And I knew what had happened to the first men to leave Earth.

The culture a man is raised in molds him greatly and ever afterwards supports the personality it has built. It can make him a Bedouin of the desert, a *bon vivant* of the boulevards or a seal hunter of the Arctic. If a man leaves his culture and loses its support, his personality is likely to crumble. The anthropologists even have a name for those poor unfortunates who have a foot in two cultures and a firm footing in neither. They call them "marginal men" and long is the list of mental symptoms that they are likely to show.

The environment molds a man greatly, but only a little compared to how much it molds a race and back to the primal amoeba we have been molded by the seas and sands and hills and valleys of Earth. When a man leaves his culture he may lose the base on which his personality has been built, but when he leaves Earth, he loses the firm foundation of his species.

You do not take a child suddenly away from his mother. Each culture provides a long training program which slowly weans him. Little by little, he breaks the cords which bind him to his home.

We had prepared Alles and Sargent and Hartrik for many things, for danger and hardship and fatigue. But one loss we did not know they would have and so, with no preparation, they were, like MacDuff, "untimely ripped" from the womb of Earth. None of the three who had been in the rocket ever recovered. Some shocks are so unexpected and so great that reality can never be faced again. But now that we knew the cause, we could attempt a solution.

It was a new task for us in psychiatry and it took a long time. Three years of thinking and planning and study while the rockets were not built and the equipment sat in the desert and the generals begged and ordered and pleaded with us to hurry. But finally it was done.

No man goes into space without the special training we have devised. For long months the therapists work with him to broaden his personality and change his view of the universe. Each crewman is a citizen of the solar sys-

tem in the deepest sense of the phrase. He has studied what is known of the geography of the planets and the possibilities they hold for the cities of man. He goes to prepare a new planet for its inhabitants and he goes as a representative of his species to a place where humanity belongs. He goes as a Columbus or a Magellan to new and uncharted seas to find new lands for his countrymen. As a child he was a citizen first of his family, then of his town and as an adult, of his country. We mature him further, until as a citizen first of his planet and then of the solar system, he can view other planets as he once would have viewed other cities and states of his own nation. He can take his world with him because he belongs to it completely instead of in part. We—in the words of John Donne—make him so "involved in mankind" that he can never again be cut off from his source. He carries his homeland with him wherever he may go.

We have the solar system now. The dome cities have risen on Venus, Mars and Ganymede. The next step should come more easily. They are building the *Centaurus* now and in the buildings shaded by her giant bulk my successors are training the first men to be citizens of the galaxy.

THE END

THE ANALYTICAL LABORATORY

This An Lab business is a fine guessing game for both editor, author and reader—but it's got a little more spice to it when you're one of the authors. You readers, on the other hand, are the ones who hand out the bonuses; your tribute and praise to a well-done yarn has real meaning—this month, the meaning will be the bonus for Cliff Simak and Isaac Asimov.

The authors whose stories are in this issue are now wondering who gets the satisfaction, and cash, of your choice as No. 1.

In the March, 1954 issue, it went this way:

Place	*Story*	*Author*	*Points*
1.	Immigrant	Clifford D. Simak	1.50
2.	Sucker Bait (Pt. 2)	Isaac Asimov	2.42
3.	Final Exam	Arthur Zirul	2.66
4.	I Made You	Walter M. Miller, Jr.	3.28

Due to the length of "Sucker Bait" and "Immigrant" there were only four stories in the March issue. Which brings up a problem I'd appreciate your comments on: Do you feel that a four-story issue is to be avoided? Would you prefer more, shorter stories, or prefer that I squeeze in some long one-piece items, even if it means reducing the number of stories? THE EDITOR.

NEIGHBOR

BY CLIFFORD D. SIMAK

A darned pleasant neighbor he was, too—even if it was true that having him as a neighbor was a bit—well, confining!

Illustrated by Kirberger

Coon Valley is a pleasant place, but there's no denying it's sort of off the beaten track and it's not a place where you can count on getting rich because the farms are small and a lot of the ground is rough. You can farm the bottomlands, but the hillsides are only good for pasture and the roads are just dirt roads, impassable at certain times of year.

The old-timers, like Bert Smith and Jingo Harris and myself, are well-satisfied to stay here, for we grew up with the country and we haven't any illusions about getting rich and we'd feel strange and out-of-place anywhere but in the valley. But there are others, newcomers, who move in and get discouraged after a while and up and move away, so there usually is a farm or two, standing idle, waiting to be sold.

We are just plain dirt farmers, with emphasis on the dirt, for we can't afford a lot of fancy machinery and we don't go in for blooded stock—but there's nothing wrong with us; we're just everyday, the kind of people you meet all over these United States. Because we're out of the way and some of the families have lived here for so long, I suppose you could say that we have gotten clannish. But that doesn't mean we don't like outside folks; it just means we've lived so long together that we've got to know and like one another and are satisfied with things just as they are.

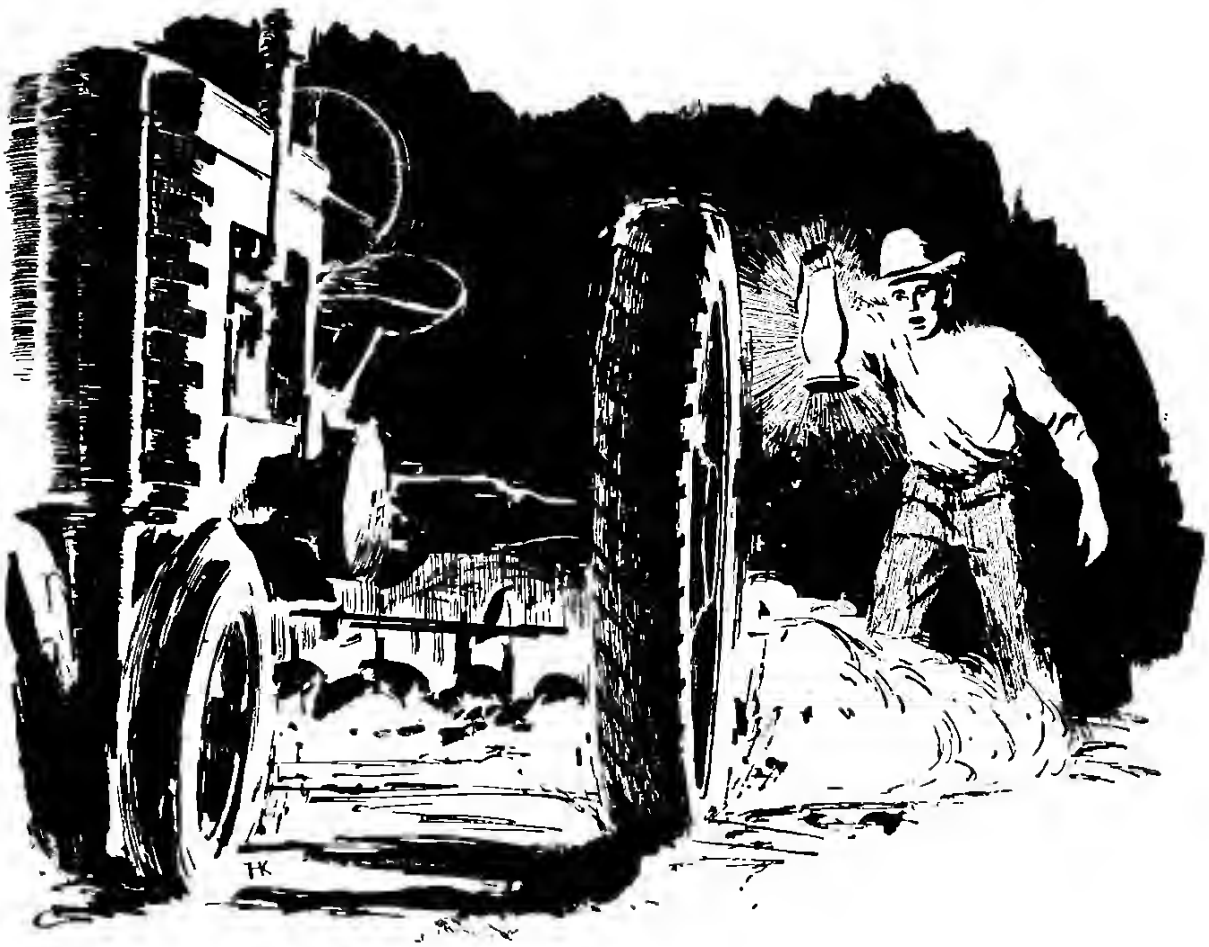
We have radios, of course, and we listen to the programs and the news, and some of us take daily papers, but I'm afraid that we may be a bit provincial, for it's fairly hard to get us stirred up much about world

happenings. There's so much of interest right here in the valley we haven't got the time to worry about all those outside things. I imagine you'd call us conservative, for most of us vote Republican without even wondering why and there's none of us who has much time for all this government interference in the farming business.

The valley has always been a pleasant place—not only the land, but the people in it, and we've always been fortunate in the new neighbors that we get. Despite new ones coming in every year or so, we've never had a really bad one and that means a lot to us.

But we always worry a little when one of the new ones up and moves away and we speculate among ourselves, wondering what kind of people will buy or rent the vacant farm.

The old Lewis farm had been abandoned for a long time, the buildings all run down and gone to ruin and the fields gone back to grass. A dentist over at Hopkins Corners had rented it for several years and run some cattle in it, driving out on week-ends to see how they were doing. We used



to wonder every now and then if anyone would ever farm the place again, but finally we quit wondering, for the buildings had fallen into such disrepair that we figured no one ever would. I went in one day and talked to the banker at Hopkins Corners, who had the renting of the place, and told him I'd like to take it over if the dentist ever gave it up. But he told me the owners, who lived in Chicago then, were anxious to sell rather than to rent it, although he didn't seem too optimistic that anyone would buy it.

Then one spring a new family moved onto the farm and in time we learned it had been sold and that the new family's name was Heath—Reginald Heath. And Bert Smith said to me: "Reginald! That's a hell of a name for a farmer!" But that was all he said.

Jingo Harris stopped by one day, coming home from town, when he saw Heath out in the yard, to pass the time of day. It was a neighborly thing to do, of course, and Heath seemed glad to have him stop, although Jingo said he seemed to be a funny kind of man to be a farmer.

"He's a foreigner," Jingo told me. "Sort of dark. Like he might be a Spaniard or from one of those other countries. I don't know how he got that Reginald. Reginald is English and Heath's no Englishman."

Later on we heard that the Heaths weren't really Spanish, but were Rumanians or Bulgarians and that they were refugees from the Iron Curtain.

But Spanish, or Rumanian, or Bulgarian, the Heaths were workers. There was Heath and his wife and a half-grown girl and all three of them worked all the blessed time. They paid attention to their business and didn't bother anyone and because of this we liked them, although we didn't have much to do with them. Not that we didn't want to or that they didn't want us to; it's just that in a community like ours new folks sort of have to grow in instead of being taken in.

Heath had an old beaten-up, wired-together tractor that made a lot of noise, and as soon as the soil was dry enough to plow he started out to turn over the fields that through the years had grown up to grass. I used to wonder if he worked all night long, for many times when I went to bed I heard the tractor running. Although that may not be as late as it sounds to city dwellers, for here in the valley we go to bed early—and get up early, too.

One night after dark I set out to hunt some cows, a couple of fence-jumping heifers that gave me lots of trouble. Just let a man come in late from work and tired and maybe raining a little and dark as the inside of a cat and those two heifers would turn up missing and I'd have to go and hunt them. I tried all the different kinds of pokes and none of them did any good. When a heifer gets to

fence-jumping there isn't much that can be done with her.

So I lit a lantern and set out to hunt for them, but I hunted for two hours and didn't find a trace of them. I had just about decided to give up and go back home when I heard the sound of a tractor running and realized that I was just above the west field of the old Lewis place. To get home I'd have to go right past the field and I figured it might be as well to wait when I reached the field until the tractor came around and ask Heath if he had seen the heifers.

It was a dark night, with thin clouds hiding the stars and a wind blowing high in the treetops and there was a smell of rain in the air. Heath, I figured, probably was staying out extra late to finish up the field ahead of the coming rain, although I remember that I thought he was pushing things just a little hard. Already he was far ahead of all the others in the valley with his plowing.

So I made my way down the steep hillside and waded the creek at a shallow place I knew and while I was doing this I heard the tractor make a complete round of the field. I looked for the headlight, but I didn't see it and I thought probably the trees had hidden it from me.

I reached the edge of the field and climbed through the fence, walking out across the furrows to intercept the tractor. I heard it make the turn to the east of me and start down the field toward me and although I could hear the noise of it, there wasn't any light.

I found the last furrow and stood there waiting, sort of wondering, not too alarmed as yet, how Heath managed to drive the rig without any light. I thought that maybe he had cat eyes and could see in the dark and although it seemed funny later when I remembered it, the idea that a man might have cat eyes did not seem funny then.

The noise kept getting louder and it seemed to be coming pretty close, when all at once the tractor rushed out of the dark and seemed to leap at me. I guess I must have been afraid that it would run over me, for I jumped back a yard or two, with my heart up in my neck. But I needn't have bothered, for I was out of the way to start with.

The tractor went on past me and I waved the lantern and yelled for Heath to stop and as I waved the lantern the light was thrown onto the rear of the tractor and I saw that there was no one on it.

A hundred things went through my mind, but the one idea that stuck was that Heath had fallen off the tractor and might be lying injured, somewhere in the field.

I ran after the tractor, thinking to shut it down before it got loose and ran into a tree or something, but by the time I reached it, it had reached a turn and it was making

that turn as neatly as if it had been broad daylight and someone had been driving it.

I jumped up on the drawbar and grabbed the seat, hauling myself up. I reached out a hand, grabbing for the throttle, but with my hand upon the metal I didn't pull it back. The tractor had completed the turn now and was going down the furrow—and there was something else.

Take an old tractor, now—one that wheezed and coughed and hammered and kept threatening to fall apart, like this one did—and you are bound to get a lot of engine vibration. But in this tractor there was no vibration. It ran along as smooth as a high-priced car and the only jolts you got were when the wheels hit a bump or slight gully in the field.

I stood there, hanging onto the lantern with one hand and clutching the throttle with the other, and I didn't do a thing. I just rode down to the point where the tractor started to make another turn. Then I stepped off and went on home. I didn't hunt for Heath lying in the field, for I knew he wasn't there.

I suppose I wondered how it was possible, but I didn't really fret myself too much trying to figure it all out. I imagine, in the first place, I was just too numb. You may worry a lot about little things that don't seem quite right, but when you run into a big thing, like that self-operating tractor, you sort of give up automatically, knowing that it's too big for your brain to handle, that it's something you haven't got a chance of solving. And after a while you forget it because it's something you can't live with. So your mind rejects it.

I got home and stood out in the barnyard for a moment, listening. The wind was blowing fairly hard by then and the first drops of rain were falling, but every now and then, when the wind would quieten down, I could hear the tractor.

I went inside the house and Helen and the kids were all in bed and sound asleep, so I didn't say anything about it that night. And the next morning, when I had a chance to think about it, I didn't say anything at all. Mostly, I suppose, because I knew no one would believe me and that I'd have to take a lot of kidding about automatic tractors.

Heath got his plowing done and his crops in, well ahead of everyone in the valley. The crops came up in good shape and we had good growing weather; then along in June we got a spell of wet, and everyone got behind with corn plowing because you can't go out in the field when the ground is soggy. All of us chored around our places, fixing fences and doing other odd jobs, cussing out the rain and watching the weeds grow like mad in the unplowed field.

All of us, that is, except Heath. His corn was clean as a whistle and

you had to hunt to find a weed. Jingo stopped by one day and asked him how he managed, but Heath just laughed a little, in that quiet way of his, and talked of something else.

The first apples finally were big enough for green-apple pies and there is no one in the country makes better green-apple pies than Helen. She wins prizes with her pies every year at the county fair and she is proud of them.

One day she wrapped up a couple of pies and took them over to the Heaths. It's a neighborly way we have of doing in the valley, with the women running back and forth from one neighbor to another with their cooking. Each of them has some dish she likes to show off to the neighbors and it's a sort of harmless way of bragging.

Helen and the Heaths got along just swell. She was late in getting home and I was starting supper, with the kids yelling they were hungry when-do-we-eat-around-here, when she finally showed up.

She was full of talk about the Heaths—how they had fixed up the house, you never would have thought anyone could do so much to such a terribly run-down place as they had, and about the garden they had—especially about the garden. It was a big one, she said, and beautifully taken care of and it was full of vegetables she had never seen before. The funniest things you ever saw, she said. Not the ordinary kind of vegetables.

We talked some about those vegetables, speculating that maybe the Heaths had brought the seeds out with them from behind the Iron Curtain, although so far as I could remember, vegetables were vegetables, no matter where you were. They grew the same things in Russia or Rumania or Timbuktu as we did. And, anyhow, by this time I was getting a little skeptical about that story of their escaping from Rumania.

But we didn't have the time for much serious speculation on the Heaths, although there was plenty of casual gossip going around the neighborhood. Haying came along and then the small-grain harvest and everyone was busy. The hay was good and the small-grain crop was fair, but it didn't look like we'd get much corn. For we hit a drought. That's the way it goes—too much rain in June, not enough in August.

We watched the corn and watched the sky and felt hopeful when a cloud showed up, but the clouds never meant a thing. It just seems at times that God isn't on your side.

Then one morning Jingo Harris showed up and stood around, first on one foot, then the other, talking to me while I worked on an old corn binder that was about worn out and which it didn't look nohow I'd need to use that year.

"Jingo," I said, after I'd watched him fidget for an hour or more, "you got something on your mind."

He blurted it out then. "Heath got rain last night," he said.

"No one else did," I told him.

"I guess you're right," said Jingo. "Heath's the only one."

He told me how he'd gone to cut through Heath's north cornfield, carrying back a couple of balls of binder twine he'd borrowed from Bert Smith. It wasn't until he'd crawled through the fence that he noticed the field was wet, soaked by a heavy rain.

"It must have happened in the night," he said.

He thought it was funny, but figured maybe there had been a shower across the lower end of the valley, although as a rule rains travel up and down the valley, not across it. But when he had crossed the corner of the field and crawled through the fence, he noticed it hadn't rained at all. So he went back and walked around the field and the rain had fallen on the field, but nowhere else. It began at the fence and ended at the fence.

When he'd made a circuit of the field he sat down on one of the balls of twine and tried to get it all thought out, but it made no sense--furthermore, it was plain unbelievable.

Jingo is a thorough man. He likes to have all the evidence and know all there is to know before he makes up his mind. So he went over to Heath's second corn patch, on the west side of the valley. And once again he found that it had rained on that field—on the field, but not around the field.

"What do you make of it?" Jingo asked me and I said I didn't know. I came mighty close to telling him about the unmanned tractor, but I thought better of it. After all, there was no point in getting the neighborhood stirred up.

After Jingo left I got in the car and drove over to the Heath farm, intending to ask him if he could loan me his posthole digger for a day or two. Not that I was going to dig any postholes, but you have to have some excuse for showing up at a neighbor's place.

I never got a chance to ask him for that posthole digger, though. Once I got there I never even thought of it.

Heath was sitting on the front steps of the porch and he seemed glad to see me. He came down to the car and shook my hand and said, "It's good to see you, Calvin." The way he said it made me feel friendly and sort of important, too--especially that Calvin business, for everyone else just calls me Cal. I'm not downright sure, in fact, that anyone in the neighborhood remembers that my name is Calvin.

"I'd like to show you around the place," he said. "We've done some fixing up."

Fixing up wasn't exactly the word for it. The place was spic and span. It looked like some of those Pennsylvania and Connecticut farms you see in the magazines. The house and all the other buildings had been ram-

shackle with all the paint peeled off them and looking as if they might fall down at any minute. But now they had a sprightly, solid look and they gleamed with paint. They didn't look new, of course, but they looked as if they'd always been well taken care of and painted every year. The fences were all fixed up and painted, too, and the weeds were cut and a couple of old unsightly scrap-lumber piles had been cleaned up and burned. Heath had even tackled an old iron and machinery junk pile and had it sorted out.

"There was a lot to do," said Heath, "but I feel it's worth it. I have an orderly soul. I like to have things neat."

Which might be true, of course, but he'd done it all in less than six months' time. He'd come to the farm in early March and it was only August and he'd not only put in some hundred acres of crops and done all the other farm work, but he'd got the place fixed up. And that wasn't possible, I told myself. One man couldn't do it, not even with his wife and daughter helping—not even if he worked twenty-four hours a day and didn't stop to eat. Or unless he could take time and stretch it out to make one hour equal three or four.

I trailed along behind Heath and thought about that time-stretching business and was pleased at myself for thinking of it, for it isn't often that I get foolish thoughts that are likewise pleasing. Why, I thought, with a deal like that you could stretch out any day so you could get all the work done you wanted to. And if you could stretch out time, maybe you could compress it, too, so that a trip to a dentist, for example, would only seem to take a minute.

Heath took me out to the garden and Helen had been right. There were the familiar vegetables, of course—cabbages and tomatoes and squashes and all the other kinds that are found in every garden—but in addition to this there were as many others I had never seen before. He told me the names of them and they seemed to be queer names then, although now it seems a little strange to think they once had sounded queer, for now everyone in the valley grows these vegetables and it seems like we have always had them.

As we talked he pulled up and picked some of the strange vegetables and put them in a basket he had brought along.

"You'll want to try them all," he said. "Some of them you may not like at first, but there are others that you will. This one you eat raw, sliced like a tomato, and this one is best boiled, although you can bake it, too—"

I wanted to ask him how he'd come on the vegetables and where they had come from, but he didn't give me a chance; he kept on telling me about them and how to cook them and that

this one was a winter keeper and that one you could can and he gave me one to eat raw and it was rather good.

We'd got to the far end of the garden and was starting to come back when Heath's wife ran around the corner of the house.

Apparently she didn't see me at first or had forgotten I was there, for she called to him and the name she called him wasn't Reginald or Reggie, but a foreign-sounding name. I won't even try to approximate it, for even at the time I wasn't able to recall it a second after hearing it. It was like no word I'd ever heard before.

Then she saw me and stopped running and caught her breath, and a moment later said she'd been listening in on the party line and that Bert Smith's little daughter, Ann, was terribly sick.

"They called the doctor," she said, "but he is out on calls and he won't get there in time."

"Reginald," she said, "the symptoms sound like—"

And she said another name that was like none I'd ever heard or expect to hear again.

Watching Heath's face, I could swear I saw it pale despite his olive tinge of skin.

"Quick!" he shouted and grabbed me by the arm.

We ran around in front to his old clunk of a car. He threw the basket of vegetables in the back seat and jumped behind the wheel. I scrambled in after him and tried to close the door, but it wouldn't close. The lock kept slipping loose and I had to hang onto the door so it wouldn't bang.

We lit out of there like a turpentined dog and the noise that old car made was enough to deafen one. Despite my holding onto it, the door kept banging and all the fenders rattled and there was every other kind of noise you'd expect a junk-heap car to make, with an extra two or three thrown in.

I wanted to ask him what he planned to do, but I was having trouble framing the question in my mind and even if I had known how to phrase it I doubt he could have heard me with all the racket that the car was making.

So I hung on as best I could and tried to keep the door from banging and all at once it seemed to me the car was making more noise than it had any call to. Just like the old haywire tractor made more noise than any tractor should. Too much noise, by far, for the way that it was running. Just like on the tractor, there was no engine vibration and despite all the banging and the clanking we were making time. As I've said, our valley roads are none too good, but even so I swear there were places we hit seventy and we went around sharp corners where, by rights, we should have gone into the ditch at the speed that we were going, but the car just

seemed to settle down and hug the road and we never even skidded.

We pulled up in front of Bert's place and Heath jumped out and ran up the walk, with me following him.

Amy Smith came to the door and I could see that she'd been crying, and she looked a little surprised to see the two of us.

We stood there for a moment without saying anything, then Heath spoke to her and here is a funny thing: Heath was wearing a pair of ragged overalls and a sweat-stained shirt and he didn't have a hat and his hair was all rumpled up, but there was a single instant when it seemed to me that he was well-dressed in an expensive business suit and that he took off his hat and bowed to Amy.

"I understand," he said, "that the little girl is sick. Maybe I can help."

I don't know if Amy had seen the same thing that I had seemed to see, but she opened the door and stood to one side so that we could enter.

"In there," she said.

"Thank you, ma'm," said Heath, and went into the room.

Amy and I stood there for a moment, then she turned to me and I could see the tears in her eyes again.

"Cal, she's awful sick," she said.

I nodded miserably, for now the spell was gone and common sense was coming back again and I wondered at the madness of this farmer who thought that he could help a little girl who was terribly sick. And at my madness for standing there, without even going in the room with him.

But just then Heath came out of the room and closed the door softly behind him.

"She's sleeping now," he said to Amy. "She'll be all right."

Then, without another word, he walked out of the door. I hesitated a moment, looking at Amy, wondering what to do. And it was pretty plain there was nothing I could do. So I followed him.

We drove back to his farm at a sober rate of speed, but the car banged and thumped just as bad as ever.

"Runs real good," I yelled at him.

He smiled a bit.

"I keep it tinkered up," he yelled back at me.

When we got to his place, I got out of his car and walked over to my own.

"You forgot the vegetables," he called after me.

So I went back to get them.

"Thanks a lot," I said.

"Any time," he told me.

I looked straight at him, then, and said: "It sure would be fine if we could get some rain. It would mean a lot to us. A soaking rain right now would save the corn."

"Come again," he told me. "It was good to talk with you."

And that night it rained, all over the valley, a steady, soaking rain, and the corn was saved.

And Ann got well.

The doctor, when he finally got to Bert's, said that she had passed the crisis and was already on the mend. One of those virus things, he said. A lot of it around. Not like the old days, he said, before they got to fooling around with all their miracle drugs, mutating viruses right and left. Used to be, he said, a doctor knew what he was treating, but he don't know any more.

I don't know if Bert or Amy told Doc about Heath, although I imagine that they didn't. After all, you don't tell a doctor that a neighbor cured your child. And there might have been someone who would have been ornery enough to try to bring a charge against Heath for practicing medicine without a license, although that would have been pretty hard to prove. But the story got around the valley and there was a lot of talk. Heath, I heard, had been a famous doctor in Vienna before he'd made his getaway. But I didn't believe it. I don't even believe those who started the story believed it, but that's the way it goes in a neighborhood like ours.

That story, and others, made quite a flurry for a month or so, but then it quieted down and you could see that the Heaths had become one of us and belonged to the valley. Bert went over and had quite a talk with Heath and the women-folks took to calling Mrs. Heath on the telephone, with some of those who were listening in breaking in to say a word or two, thereby initiating Mrs. Heath into the round-robin telephone conversations that are going on all the time on our valley party line, with it getting so that you have to bust in

on them and tell them to get off the line when you want to make an important call. We had Heath out with us on our coon hunts that fall and some of the young bloods started paying attention to Heath's daughter. It was almost as if the Heaths were old-time residents.

As I've said before, we've always been real fortunate in getting in good neighbors.

When things are going well, time has a way of flowing along so smoothly that you aren't conscious of its passing, and that was the way it was in the valley.

We had good years, but none of us paid much attention to that. You don't pay much attention to the good times, you get so you take them for granted. It's only when bad times come along that you look back and realize the good times you have had.

A year or so ago I was just finishing up the morning chores when a car with a New York license pulled up at the barnyard gate. It isn't very often we see an out-of-state license plate in the valley, so I figured that it probably was someone who had gotten lost and had stopped to ask directions. There was a man and woman in the front seat and three kids and a dog in the back seat and the car was new and shiny.

I was carrying the milk up from the barn and when the man got out I put the pails down on the ground and waited for him.

He was a youngish sort of fellow and he looked intelligent and he had good manners.

He told me his name was Rickard and that he was a New York newspaperman on vacation and had dropped into the valley on his way out west to check some information.

It was the first time, so far as I knew, that the valley had ever been of any interest newswise and I said so. I said we never did much here to get into the news.

"It's no scandal," Rickard told me, "if that is what you're thinking. It's just a matter of statistics."

There are a lot of times when I don't catch a situation as quickly as I should, being a sort of deliberate type, but it seems to me now that immediately he said statistics I could see it coming.

"I did a series of farm articles a few months back," said Rickard, "and to get my information I had to go through a lot of government statistics. I never got so sick of anything in my entire life."

"And?" I asked, not feeling too well myself.

"I found some interesting things about this valley," he went on. "I remember that I didn't catch it for a while. Went on past the figures for a ways. Almost missed the significance, in fact. Then I did a double-take and backed up and looked at them again. The full story wasn't in that report,

of course. Just a hint of something. So I did some more digging and came up with other facts."

I tried to laugh it off, but he wouldn't let me.

"Your weather, for one thing," he said. "Do you realize you've had perfect weather for the past ten years?"

"The weather's been pretty good," I admitted.

"It wasn't always good. I went back to see."

"That's right," I said. "It's been better lately."

"Your crops have been the best they've ever been in the last ten years."

"Better seed," I said. "Better ways of farming."

He grinned at me. "You guys haven't changed your way of farming in the last quarter century."

And he had me there, of course.

"There was an army worm invasion two years ago," he said. "It hit all around you, but you got by scot-free."

"We were lucky. I remember we said so at the time."

"I checked health records," he said. "Same thing once again. For ten solid years. No measles, no chickenpox, no pneumonia. No nothing. One death in ten full years—complications attendant on old age."

"Old Man Parks," I said. "He was going on to ninety. Fine old gentleman."

"You see," said Rickard.

I did see.

The fellow had the figures. He had tracked it down, this thing we hadn't even realized, and he had us cold.

"What do you want me to do about it?" I asked.

"I want to talk to you about a neighbor."

"I won't talk about any of my neighbors. Why don't you talk to him yourself?"

"I tried to, but he wasn't home. Fellow down the road said he'd gone into town. Whole family had gone into town."

"Reginald Heath," I said. There wasn't much sense in playing dumb with Rickard, for he knew all the angles.

"That's the man. I talked to folks in town. Found out he'd never had to have any repair work done on any of his machinery or his car. Has the same machinery he had when he started farming. And it was worn out then."

"He takes good care of it," I told him. "He keeps it tinkered up."

"Another thing," said Rickard. "Since he's been here he's not bought a drop of gasoline."

I'd known the rest of it, of course, although I'd never stopped to think about it. But I didn't know about the gasoline. I must have shown my surprise, for Rickard grinned at me.

"What do you want?" I asked.

"A story."

"Heath's the man to talk to. I don't know a thing to help you."

And even when I said it I felt easy in my mind. I seemed to have

an instinctive faith that Heath could handle the situation, that he'd know just what to do.

But after breakfast I couldn't settle down to work. I was pruning the orchard, a job I'd been putting off for a year or two and that badly needed doing. I kept thinking of that business of Heath not buying gasoline and that night I'd found the tractor plowing by itself and how smooth both the car and tractor ran despite all the noise they made.

So I laid down my pruning hook and shears and struck out across the fields. I knew the Heath family was in town, but I don't think it would have made any difference to me if they'd been at home. I think I would have gone just the same. For more than ten years now, I realized, I'd been wondering about that tractor and it was time that I found out.

I found the tractor in the machine shed and I thought maybe I'd have some trouble getting into it. But I didn't have a bit. I slipped the catches and the hood lifted up and I found exactly what I had thought I'd find, except that I hadn't actually worked out in my mind the picture of what I'd find underneath that hood.

It was just a block of some sort of shining metal that looked almost like a cube of heavy glass. It wasn't very big, but it had a massive look about it, as if it might have been a heavy thing to lift.

You could see the old bolt holes where the original internal combustion engine had been mounted and a heavy piece of some sort of metal had been fused across the frame to seat that little power plant. And up above the shiny cube was an apparatus of some sort. I didn't take the time to find out how it worked, but I could see that it was connected to the exhaust and I knew it was a dingus that disguised the power plant. You know how in electric trains they have it fixed up so that the locomotive goes *chuff-chuff* and throws out a stream of smoke. Well, that was what that contraption was. It threw out little puffs of smoke and made a tractor noise.

I stood there looking at it and I wondered why it was, if Heath had an engine that worked better than an internal combustion engine, he should have gone to so much trouble to hide the fact he had it. If I'd had a thing like that, I knew, I'd make the most of it. I'd get someone to back me and go into production and in no time at all I'd be stinking rich. And there'd been nothing in the world to prevent Heath from doing that. But instead he'd fixed the tractor so it looked and sounded like an ordinary tractor and he'd fixed his car to make so much noise that it hid the fact it had a new type motor. Only he had overdone it. He'd made both the car and tractor make more noise than they should. And he'd missed an

important bet in not buying gasoline. In his place I'd bought the stuff, just the way you should, and thrown it away or burned it to get rid of it.

It almost seemed to me that Heath might have had something he was hiding all these years, that he'd tried deliberately to keep himself unnoticed. As if he might really have been a refugee from the Iron Curtain — or from somewhere else.

I put the hood back in place again and snapped the catches shut and when I went out I was very careful to shut the machine shed door securely.

I went back to my pruning and I did quite a bit of thinking and while I was doing it I realized that I'd been doing this same thinking, piecemeal, ever since that night I'd found the tractor running by itself. Thinking of it in snatches and not trying to correlate all my thinking and that way it hadn't added up to much, but now it did and I suppose I should have been a little scared.

But I wasn't scared. Reginald Heath was a neighbor, and a good one, and we'd gone hunting and fishing together and we'd helped one another with haying and threshing and one thing and another and I liked the man as well as anyone I had ever known. Sure, he was a little different and he had a funny kind of tractor and a funny kind of car and he might even have a way of stretching time and since he'd come into the valley we'd been fortunate in weather and in health. All true, of course, but nothing to be scared of. Nothing to be scared of, once you knew the man.

For some reason or other I remembered the time several years before when I'd dropped by of a summer evening. It was hot and the Heath family had brought chairs out on the lawn because it was cooler there. Heath got me a chair and we sat and talked, not about anything in particular, but whatever came into our heads.

There was no moon, but there were a lot of stars and they were the prettiest I have ever seen them.

I called Heath's attention to them and, just shooting off my mouth, I told him what little I'd picked up about astronomy.

"They're a long ways off," I said. "So far off that their light takes years to reach us. And all of them are suns. A lot of them bigger than our sun."

Which was about all I knew about the stars.

Heath nodded gravely.

"There's one up there," he said, "that I watch a lot. That blue one, over there, Well, sort of blue, anyhow. See it? See how it twinkles. Like it might be winking at us. A friendly sort of star."

I pretended that I saw the one he was pointing at, although I wasn't sure I did, there were so many of them and a lot of them were twinkling.

Then we got to talking about some-

thing else and forgot about the stars. Or at least I did.

Right after supper, Bert Smith came over and said that Rickard had been around asking him some questions and that he'd been down to Jingo's place and that he'd said he'd see Heath just as soon as Heath got back from town.

Bert was a bit upset about it, so I tried to calm him down.

"These city folks get excited easy," I told him. "There is nothing to it."

I didn't worry much about it because I felt sure that Heath could handle things and even if Rickard did write a story for the New York papers it wouldn't bother us. Coon Valley is a long piece from New York.

I figured we'd probably seen and heard the last from Rickard.

But in all my life, I've never been more wrong.

About midnight or so I woke up with Helen shaking me.

"There's someone at the door," she said. "Go see who it is."

So I shucked into my overalls and shoes and lit the lamp and went downstairs to see.

While I'd been getting dressed there'd been some knocking at the door, but as soon as I lit the lamp it quit.

I went to the door and opened it and there stood Rickard and he wasn't near as chipper as he'd been in the morning.

"Sorry to get you up," he said, "but it seems that I am lost."

"You can't be lost," I told him. "There isn't but one road through the valley. One end of it ties up to Sixty and the other to Eighty-five. You follow the valley road and you're bound to hit one or the other of them."

"I've been driving," he told me, "for the last four hours and I can't find either of them."

"Look," I said, "all you do is drive one way or the other. You can't get off the road. Fifteen minutes either way and you're on a State highway."

I was exasperated with him, for it seemed a silly thing to do. And I don't take kindly to being routed out at midnight.

"But I tell you I am lost," he said in a sort of desperation and I could see that he was close to panic. "The wife is getting scared and the kids are dead on their feet—"

"All right," I told him. "Let me get on my shirt and tie my shoes. I'll get you out of here."

He told me he wanted to get to Sixty, so I got out my car and told him to follow me. I was pretty sore about it, but I figured the only thing to do was to help him out. He'd upset the valley and the sooner out the better.

I drove for thirty minutes before I began to get confused myself. That was twice as long as it should have taken to get out to the highway. But the road looked all right and there seemed to be nothing wrong, except

for the time it took. So I kept on going. At the end of forty-five minutes we were back in front of my place again.

I couldn't figure it out for the life of me. I got out of my car and went back to Rickard's car.

"You see what I mean," he said.

"We must have got turned around," I said.

His wife was almost hysterical.

"What's going on?" she asked me in a high, shrill voice. "What is going on around here?"

"We'll try again," I said. "We'll drive slower this time so we don't make the same mistake."

I drove slower and this time it took an hour to get back to the farm. So we tried for Eighty-five and forty minutes later were right back where we started.

"I give up," I told them. "Get out and come in. We'll fix up some beds. You can spend the night and we'll get you out come light."

I cooked up some coffee and found stuff to make sandwiches while Helen fixed up beds to take care of the five of them.

"The dog can sleep out here in the kitchen," she said.

I got an apple box and quilt and fixed the dog a bed.

The dog was a nice little fellow, a wirehair who was full of fun, and the Rickard kids were about as fine a bunch of kids as you'd find anywhere.

Mrs. Rickard was all set to have hysterics, but Helen got her to drink some coffee and I wouldn't let them talk about not being able to get out.

"Come daylight," I told them, "and there'll be nothing to it."

After breakfast they were considerably calmed down and seemed to have no doubt they could find Number Sixty. So they started out alone, but in an hour were back again. I took my car and started out ahead of them and I don't mind admitting I could feel bare feet walking up and down my spine.

I watched closely and all at once I realized that somehow we were headed back into the valley instead of heading out of it. So I stopped the car and we turned our cars around and headed back in the right direction. But in ten minutes we were turned around again. We tried again and this time we fairly crawled, trying to spot the place where we got turned around. But we could never spot it.

We went back to my place and I called up Bert and Jingo and asked them to come over.

Both of them tried to lead the Rickards out, one at a time, then the two of them together, but they were no better at it than I was. Then I tried it alone, without the Rickards following me, and I had no trouble at all. I was out to highway Sixty and back in half an hour. So we thought maybe the jinx was broken and I tried to lead out the Rickard

car, but it was no soap.

By mid-afternoon we knew the answer. Any of the natives could get out of the valley, but the Rickards couldn't.

Helen put Mrs. Rickard to bed and fed her some sedative and I went over to see Heath.

He was glad to see me and he listened to me, but all the time I was talking to him I kept remembering how one time I had wondered if maybe he could stretch out time. When I had finished he was silent for a while, as if he might have been going over some decision just to be certain that it was right.

"It's a strange business, Calvin," he said finally, "and it doesn't seem right the Rickards should be trapped in this valley if they don't want to stay here.

"Yet, it's a fortunate thing for us, actually. Rickard was planning on writing a story about us and if he'd written as he planned to, there'd been a lot of attention paid us. There would have been a crowd of people coming in—other newspapermen and government men and people from the universities and the idly curious. They'd have upset our lives and some of them would have offered us big sums of money for our farms, much more than they're worth, and all of it would spoil the valley for us. I don't know about you, but I like the valley as it is. It reminds me of . . . well, of another place."

"Rickard still can telephone that story," I told him, "or he can mail it out. Just keeping Rickard here won't prevent that story being printed."

"Somehow I think it will," he said. "I am fairly certain he won't telephone it or send it in the mails."

I had come half prepared to go to bat for Rickard, but I thought over what Heath had pointed out to me and I didn't do it.

I saw that if there were some principle or power which kept the valley healthy and insured good weather and made living pleasant, why, then, the rest of the world would be hell-bent to use the same principle or power. It might have been selfish of me, but I felt fairly certain the principle or power couldn't be spread thin enough to cover all the world. And if anyone were to have it, I wanted it kept right here, where it rightfully belonged.

And there was another thing: If the world should learn there was such a power or principle and if we couldn't share it or refused to share it, then all the world would be sore at us and we'd live in the center of a puddle of hatred.

I went back home and had a talk with Rickard and I didn't try to hide anything from him. He was all set to go and have it out with Heath, but I advised against it. I pointed out that he didn't have a shred of proof and he'd only make himself look silly, for

Heath would more than likely act as if he didn't know what he was getting at. After quite a tussle, he took my advice.

The Rickards stayed on at our place for several days and occasionally Rickard and I would make a trial run just to test the situation out, but there was no change.

Finally Bert and Jingo came over and we had a council of war with the Rickard family. By this time Mrs. Rickard was taking it somewhat better and the Rickard kids were happy with the outdoor life and the Rickard dog was busily engaged in running all the valley rabbits down to skin and bones.

"There's the old Chandler place up at the head of the valley," said Jingo. "No one's been living there for quite a while, but it's in good shape. It could be fixed up so it was comfortable."

"But I can't stay here," protested Rickard. "I can't settle down here."

"Who said anything about settling down?" asked Bert. "You just got to wait it out. Some day whatever is wrong will get straightened out and then you can get away."

"But my job," said Rickard.

Mrs. Rickard spoke up then. You could see she didn't like the situation any better than he did, but she had that queer, practical, everyday logic that a woman at times surprises a man by showing. She knew that they were stuck here in the valley and she was out to make the best of it.

"Remember that book you're always threatening to write?" she asked. "Maybe this is it."

That did it.

Rickard mooned around for a while, making up his mind, although it already was made up. Then he began talking about the peace in the valley—the peace and quietness and the lack of hurry—just the place to write a book.

The neighbors got together and fixed up the house on the old Chandler place and Rickard called his office and made some excuse and got a leave of absence and wrote a letter to his bank, transferring whatever funds he had. Then he settled down to write.

Apparently in his phone calls and his letter writing he never even hinted at the real reason for his staying—perhaps because it would have sounded downright silly—for there was no ruckus over his failure to go back.

The valley settled down to its normal life again and it felt good after all the uproar. The neighbors shopped for the Rickards and carried out from town all the groceries and other things they needed and once in a while Rickard took the car and had a try at finding the State highways.

But mostly he wrote and in about a year he sold this book of his. Probably you have read it: "You Could Hear the Silence." Made him a hunk of money. But his New York publishers still are going slowly mad trying to understand why he steadfastly re-

fuses to stir out of the valley. He has refused lecture tours, has declined dinners in his honor and turned down all the other glitter that goes with writing a best seller.

The book didn't change Rickard at all. By the time he sold it he was well liked in the valley and seemed to like everyone—except possibly Heath. He stayed rather cold to Heath. He used to do a lot of walking, to get exercise, he said, although I think that he thought up most of his book out on those walks. And he'd stop by and chew the fat when he was out on those walks and that way everyone got to know him. He used to talk a lot about when he could get out of the valley and all of us were beginning to feel sorry that a time would come when he would leave, for the Rickards had turned out to be good neighbors. There must be something about the valley that brings out the best there is in everyone. As I have said before, we have yet to get a bad neighbor and that is something most neighborhoods can't say.

One day I had stopped on my way from town to talk a while with Heath and as we stood talking, up the road came Rickard. You could see he wasn't going anywhere, but was just out for a walk.

He stopped and talked with us for a few minutes, then suddenly he said, "You know, we've made up our minds that we would like to stay here."

"Now, that is fine," said Heath.

"Grace and I were talking about it the other night," said Rickard. "About the time when we could get out of here. Then suddenly we stopped our talking and looked at one another and we knew right then and there we didn't want to leave. It's been so peaceful and the kids like the school here so much better than in the city and the people are so fine we couldn't bear to 'eave."

"I'm glad to hear you say that," Heath told him. "But it seems to me you've been sticking pretty close. You ought to take the wife and kids in town to see a show."

And that was it. It was as simple as all that.

Life goes on in the valley as it always has, except it's even better now. All of us are healthy. We don't even seem to get colds any more. When we need rain we get it and when there's need of sun the sun is sure to shine. We aren't getting rich, for you can't get rich with all this Washington interference, but we're making a right good living. Rickard is working on his second book and once in a while I go out at night and try to locate the star Heath showed me that evening long ago.

But we still get some publicity now and then. The other night I was listening to my favorite newscaster and he had an item he had a lot of fun with.

"Is there really such a place as

Coon Valley?" he asked and you could hear the chuckle just behind the words. "If there is, the government would like to know about it. The maps insist there is and there are statistics on the books that say it's a place where there is no sickness, where the climate is ideal, where there's never a crop failure—a land of milk and honey. Investigators have gone out to seek the truth of this and they can't find the place, although people in nearby communities insist there's such a valley. Telephone calls have been made to people listed as residents of the valley, but the calls can't be completed. Letters have been written to them, but the letters are returned to the sender for one or another of the many reasons the post office has for nondelivery. Investigators have waited in nearby trading centers, but Coon Valley people never came to town while the investigators were there. If there is such a place and if the things the statistics say of it are true, the government would be very interested, for there must be data in the valley that could be studied and applied to other sectors. We have no way of knowing whether this broadcast can reach the valley—if it is any more efficient than investigators or telephone or the postal service. But if it does—and if there is such a place as Coon Valley—and if one of its residents should be listening, won't he please speak up!"

He chuckled then, chuckled very briefly, and went on to tell the latest rumor about Malenkov.

I shut off the radio and sat in my chair and thought about the times when for several days no one could find their way out of the valley and of the other times when the telephones went dead for no apparent reason. And I remembered how we'd talked about it among ourselves and wondered if we should speak to Heath about it, but had in each case decided not to, since we felt that Heath knew what he was doing and that we could trust his judgment.

It's inconvenient at times, of course, but there are a lot of compensations. There hasn't been a magazine solicitor in the valley for more than a dozen years—nor an insurance salesman, either.

THE END

WING SHOT

BY VICTOR STEPHAN

Cracking *the result of a complex mathematical variation pattern of air attack takes time—and air attack doesn't allow time. There is a nonlogical, nonmathematical technique that's worked for a long time, though. . .*

Illustrated by Kirberger

"Take Cover!" Brayle's instinctive roar was much too late. The first warning of danger was the terrifying spurt of 20 mm shells slashing through his bunker. The battery defenses, smaller antiaircraft weapons, roared their anger at the strafing jets. The attack didn't stop the main battery. The throbbing scream of shells hurtling aloft tied the holocaust below to a thunder above, a thunder blended of exploding shells and bellowing jet bombers. Innocent little clouds bracketed one of the enemy bombers and it slipped gracefully out of formation, trailing a billowing stream of white smoke.

Brayle had trouble prying himself out of the raw mud. One arm didn't want to help. Glancing up he gritted his teeth as he saw the simple dance-like formation maneuvers of the strafing jets weave across the sky for another pass. He groaned as he saw the pattern of ack-ack blooming everywhere but where they were.

"Get the pattern!" he cried to his cameraman. Then the bunker was full of whistling shrieks and the sudden explosions. Brayle dug his face into the mud again, swearing as the cameraman was flung halfway across the bunker and the camera stood untended, its huge telephoto lens pointing almost straight up.

"The camera!" roared Brayle to the second cameraman and tried to lift himself with his useless left arm. He raved helplessly as he saw the camera untended and its operator aiming a puney rocket rifle at the attacking planes as they streaked in very low, still maintaining the bewildering shifting attack pattern. In the back of his mind Brayle admired the trained movements of Carson's body as the man aimed his piece, always choosing the last in formation as a target, his shoulders swaying, anticipating, but not firing.

"Buck fever," said Brayle's mind numbly.

"Carson," he screamed, "drop that gun! Use the camera. That's an order!"

Carson ignored him and continued his attempts to aim at the flashing jets.

Brayle furiously levered himself to his feet and started toward Carson then flung himself flat as the last attack swept in. Carson's gun erupted into full automatic fire just as the bunker was filled with the whine and crash of 20 mm shells. Agonized, Brayle saw his precious camera go over in a tangle of junk. He heard a shrill cry from Carson.

In the sudden silence Brayle heard him shout, "I got him! Look, he's out of control!"

Brayle watched the erratic movements of the plane, saw it disappear below one of the smoking ruins. Then he pulled his .45 from its holster and pointed it at Carson.

"Drop the gun," he said. Numbly Carson dropped it. "You're under arrest, and, if I can make it, you'll rot in the guardhouse for the rest of your life."

"But—" began Carson.

"And," Brayle added, "if that film is ruined, I'm going to shoot you right now. Right here and now."

"But, sir—" Carson began again. Then the old detestable twist curled his lips. "Yes, sir," he said mockingly. His face mirroring the superiority of a fighting man over a desk officer.

"The fact that you may, understand it's not verified, you MAY have hit one of them in no way excuses the desertion of your duty. We need pictures or we're finished. That new attack pattern — Bring me that camera!"

"Yes, sir." Carson carefully detached the film container and brought it to him. Hastily Brayle examined it and sighed when he found it intact.

"You're lucky," he growled. "I would have shot you, you know."

"Yes, sir—instead of the enemy," said Carson, his lips curling again.

"Listen, you lousy woods runner—" Brayle began, then bit his lip. "Go get a medic and then turn yourself over to the guards. I can't spend any more time with you. Help me up!"

"Yes, sir."

Brayle sat on a sandbag and watched Carson trot away. He looked at the sodden mangled heap of Steve, his top cameraman and hugged the film pans to him as he felt the pain in his left arm for the first time. The sky was empty.

A few hours later, his arm in a neat sling, Brayle stood in front of a small group of men, civilians, who were listening carefully to his lecture.

"Well, that's it, gentlemen. By rigging a camera to a gun-mount tied into a predictor, as Dr. Kowalewsky suggested, we got the film you just saw. Dr. Lowe has had an hour or so to work on it. Do you have anything to add, Dr. Lowe?"

"Very little," Lowe's heavy voice boomed out. "Preliminary calculations seem to verify my guess. In short, the enemy has an answer to our prediction equipment. The various views of that new evasive maneuver of theirs which you just saw gave me fairly accurate values for several parameters. It's quite certain that they have the answer."

"Dr. Lowe pointed out that the values he computed were very close to being the optimal values," Brayle continued. "I think that implies good intelligence work on their part. In fact, we should have expected this after that agent Nicols was found at—"

"Do you mean the man who was transmitting proximity fuse data, Colonel Brayle?"

"Exactly." Brayle glared at his civilian team as if they were at fault. "Knowing our fuses, our predictors and some game theory from mathematics, they have outplayed our side; they have outplayed *you* men! It's come to a new low when that bunch of stupid barbarians can outwit the entire Allied Tactical Research Center!"

"Just a minute, Brayle," Paul Lowe stood up. "You're wrong on several points. One, they aren't stupid! Two, *we* haven't been outwitted, it was the military! Who insisted on linear prediction anyway? Three, we haven't lost the game until we make the last move and it's our move next!"

"In spite of your opinion of the military, Dr. Lowe," Brayle emphasized the title sarcastically, "we expect to do our jobs and we want you to do yours. This is your job and it's serious! With their air-to-air weapons and this new evasive tactic I estimate that fifteen per cent of a large armada will get through to their targets. Think of it! You yourself have estimated that we can hold out no more than three weeks if fifteen per cent get through! That's the problem—and three weeks to solve it!"

"Brayle, it will take a month to

do the math for a modification of our predictors," Paul Lowe protested. "I don't know how long it would take for the engineering changes!"

"Can't we attack the problem rather than each other?" Art Kowalewsky's calm voice oiled the water. This conference stuff always degenerates into a Brayle-Lowe tiff. Let's break it up and go to work. Paul, you could put your section onto the math. I'll have mine look into the engineering changes."

Brayle and Lowe looked at each other and suddenly grinned. Without a formal dismissal, the conference dissolved into smaller knots of men who wandered off arguing, to their own offices. Lowe stayed behind.

"Look, Brayle, a couple of hot-tempered guys like us shouldn't be working at cross-purposes. I'll behave if you will."

"It's a deal. We *do* sound a bit childish, even if I am the director."

"Meant to ask, how's the arm? What happened?"

"Oh, a strafing run," Brayle answered. "The bone is shattered but they tell me it will be O.K. after they do a bone graft. Right now it hurts like hell!"

"I already have my section working on the math. With some luck we can encode that nonlinear stuff for the computer in about a month. If they hold off using their new tactic—"

"I'm afraid they won't, Paul. In fact, they have already started! Detroit got it two hours ago on a transpolar attack. The casualties were held down by good CAA work but that one attack probably cost us at least a hundred thousand people and a great chunk of industry. I didn't mention it before. I believe that Kowalewsky's people live in Detroit, don't they?"

"Yeah, but shouldn't you tell him?"

"Paul, I have a job to do. Sometimes it isn't nice work. But if I told Kowalewsky about Detroit he'd be in no shape to work on our problem. He might blow up like one of my crew did today."

"What happened?"

Brayle told the story of Carson and his pitifully heroic attack, ignoring his basic duty, et cetera. As he finished the account, Lowe's face fell blank, his eyes stared unseeing at the blank movie screen. Shaking himself he turned slowly to the colonel.

"Can I see those films again?"

"Sure, help yourself. I'll be in my office." Brayle didn't leave, however. He watched while Lowe ran through the first film. The big man seemed to be aiming a pencil at the bomber pictured in the screen. After rewinding the film he ran it through again, this time in slow motion, still pointing the pencil. Then without even noticing Brayle, he walked slowly, head down, out of the room.

When Brayle arrived at the Center offices the next morning he found Art Kowalewsky pacing his office.

"Colonel Brayle, do you know how

Lowe's doing?"

"Nope, just got here!"

"If I didn't know him, I'd say that Paul Lowe has gone crazy! He spent the night here, kept his entire crew up, building a Rube Goldberg. Honestly! He has a model jet that flies through the long hall doing that crazy maneuver of theirs. It's a little frightening, isn't it?"

"Even worse when they're shooting at you," Brayle winced as he moved his arm. "Look, I have to have this arm fixed up this afternoon. I won't be back for several days. You men report to Colonel Davis. I'm going to brief him right now and get over to the hospital."

"Well, colonel, I'd better give you my own news. I kept my crew here too, and if our preliminary ideas check out, we won't have to worry about the engineering modifications. I think they can be made by the crew of each gun-director in less than half an hour. Look." Kowalewsky's finger sketched a crude circuit diagram. "If we put in an R F choke here, jump these leads, then after we have Lowe's new profiles—"

"Hold on, Art," sighed Brayle, "you know I can't follow that stuff! I'll just take your word and tell Lowe to listen to you. I got to get moving before some fool medical man has me dragged over to his butcher shop."

Kowalewsky watched the taut military figure move away, carefully avoiding sudden jarring motions, favoring the shattered arm. *There's a brave man and a good director, in spite of Lowe,* thought Kowalewsky. *Well, maybe I better see what Paul's doing. My boys don't need me.*

Brayle was just finishing his briefing of Colonel Davis when the phone rang again. He picked up the phone angrily and roared, "Do I have to beat off you Medics with a stick? I've got work to do. Yes, I'll be over as soon as I can." He slammed the phone down. His face was drawn and pale as he continued his outline of the situation.

"Well, that's about it, Dave. Three weeks to do the impossible. Three weeks to produce the answer. The math of which alone is practically guaranteed to take a couple of months. But we've got to get our guns on them—somehow."

The phone rang again.

"Now what?" said Brayle, his voice low and exhausted.

"Carson? Oh, yes. I don't know. I haven't got time to file formal charges. Just . . . just keep him out of circulation. Another blowup like that and everyone might catch it." He cradled the receiver gently.

"That's another thing, Dave," he said wearily, "the human element. Desperation is moving in, hopeless, suicidal desperation." Brayle's head drooped and his good hand clinched suddenly among the papers on his desk.

Colonel Davis made a phone call and in a short time Brayle allowed himself to be led away by the Medics.

It was three days before Brayle could force his way out of the hospital, three long days and two more mass raids by transpolar armadas. Two more cities: Chicago and Pittsburgh. Brayle glanced at the aerial photos: Smoking fused ruins of the Loop, of steel mills. Some of the photos blurred and speckled with radioactivity.

He pushed the photos back across the desk to Davis. "Bad," he said.

"Very bad," said Davis.

"What has the team turned up?"

"I really don't know," said Davis, embarrassed. "You mentioned the human element of desperation. It may be working here for good or bad. Lowe's got a wild idea. Come on, I'll show you."

Davis led Brayle down the hall to the main auditorium. "Lowe has commandeered the auditorium, ripped out the center seats and installed a crazy rig. Kowalewsky's helping him. They call it their new computer. Here we are."

Davis pulled open a door and stepped back to let Brayle enter. The auditorium was a mess. The center section seats had been piled onto the side section seats. The sloping floor was covered with benches, electronic equipment, and a complex switchboard. Cables laced among bench legs and one huge one snaked up the wall beside the stage. From the projection booth to the proscenium of the stage stretched a fantastic cobweb of taut wires. Art Kowalewsky, balanced precariously on a huge stepladder, trailed an electric extension cord from his soldering iron. Lowe stood in front of a battery of cameras manned by a small army of technicians. The big man was lumbering through an improvised dance, twisting, turning and waving a broomstick with the most serious face possible. Brayle and Davis came within a few feet before he noticed them and gave them a red-faced grin.

"Very graceful, Dr. Lowe," ribbed Brayle. "Shouldn't the rest of us be making blood sacrifices or something?"

"Well, somebody has to act as guinea pig, and until now I was the least useful one around. Since you're here—"

"Oh, no you don't. Remember?" Brayle was pointing at his slinged arm. With one accord they turned speculative eyes on Davis.

"Not me!" Davis backed away. "Just remembered . . . ah . . . a report! Yes, a report due today for the general! Be seeing you guys!"

Lowe and Brayle grinned a moment, then turned soberly to the confusing rig.

"Just what is it, Paul?"

"You might say it's Lowe's last chance, I guess. My boys, particularly Benson .can handle the routine reduction of data for the computers better than I can. So I dreamed up

a new computer."

"A computer?"

"Yep! I know it doesn't look like one but it is. We need one more component, though."

"Let's have the full story, eh!"

As Lowe talked, Kowalewsky joined them and watched Brayle's face turn from interest to derision, back to grudging interest.

"It may work out, Paul. Just where do you expect to find the right 'component' though?"

"That'll be your job, my dear director. I've got to stay here and tune up this insane mess that Art has made of my beautiful idea."

"I'll do the best I can. The 201 files should help and so will the psychologist at the hospital."

As Brayle opened the door to leave he saw that Lowe was back at his dance again, with the cameras patiently following every move in deadly earnest.

Back at his desk Brayle called for the 201 files then sat staring at the wall, seeing the ghosts of the jets in that queer shifting attack pattern.

The phone rang.

Mechanically he lifted the receiver. "Yes? Carson again? Now look, I told you to keep him. I don't care on what charge. He's a menace to— Hold it! Send that man to my office." Brayle slammed the receiver down and for the first time in a long time, smiled.

He was still smiling when Carson was brought in under guard. Carson saluted defiantly as Brayle dismissed the guards.

"Well, Carson, how are you?"

"Well, thank you . . . sir." Brayle smiled at the deliberate hesitation.

"Good. You still want to fight, Carson?"

"Am I busted to infantry, sir?" Carson asked.

"In a way, Gunner, in a way," said Brayle. "Come with me."

"May I give an opinion, sir," said Carson stiffly.

"No! You want to fight hand-to-hand? Well, you're going to get the chance. Now come along." Then Brayle's face relaxed into a smile. "By the way, charges against you are dismissed." He led the way out of the office to Lowe's auditorium.

The glitter of stars in the bunker was a little overpowering. Five men wore a total of seventeen stars painted on the fronts of their steel helmets. Powerful binoculars were clamped to five important sets of eyes, following the swelling thrum of the approaching enemy bombers. Without warning the camouflaged batteries exploded into violent action. The ground-shaking salvo split the sandbags in several places, trickling sand down five highly-regarded necks. The tiny black smoke puffs winked into sight, bracketing the bombers. The entire formation immediately went into their queer little dance—and the smoke puffs followed them!

"Look, look," shrieked a four-star

general. "They got'em! They got 'em! Kill 'em! Kill 'em!"

The innocuous little clouds kept pace with the enemy armada with the ease of a skillful dancer following a well-known partner. The tight formation began to disintegrate into smoking, falling pieces, as the dignified generals slapped each other on the back, danced and tried to scream above the roar of the antiaircraft guns. Five straggling bombers came through that terrible curtain of steel.

"Five! Five out of more than four squadrons, I'd say!" exulted one of the observing generals to Colonel Brayle. "And our fighters will soon take those out! A splended job, colonel, splendid!"

"Yes, indeed, Colonel Brayle," added the four-star general. "I will be happy to report most favorably on your execution of this piece of work."

"Thank you, sir, but I'd like to tell you how it was done. Show you who deserves the real credit."

"You were in charge, you get the credit. But I would like to know how it was done. Let's get back to Center and get the full story. Come, gentlemen."

Once more Brayle had assumed his lecturer's voice. As he gave the story the observation team of generals listened in rapt attention. Deliberately, he pulled a storyteller's trick and left one important fact out of his quick resumé.

"When Dr. Lowe's new computer gave us the needed data for our new profiles, everything was set, battery maintenance men alerted, et cetera, and the actual modifications were accomplished within an hour. The speed of that operation is entirely due to the genius of Dr. Kowalewsky, I might add, who worked with Dr. Lowe from start to finish. Those two, and our new computer, deserve the credit."

"I suspect, Colonel Brayle, that you are just waiting for this question, but I'll ask it anyway. How did Dr. Lowe develop and build a new computer so quickly?"

"He didn't sir. He just used one already extant."

"What one?"

"Dr. Lowe used —a man!"

A mutter ran through the listening men to erupt in the question of the four-star general. "Are you pulling our legs, colonel?"

"No, sir! Dr. Lowe used the reflex system of a human being as an analogue computer. In his own words: 'Can you build a computer which would solve the equations of motion associated with driving a car?' He also said: 'Let's dance' and try that on your computers. More precisely, he built a system for recording and measuring a man's aiming response when faced with the problem of predicting that evasive maneuver of theirs. It was done in slow motion, of course, but it solved the math. We found a needed component, a man of

blazingly fast reactions, in a guardhouse where, I hesitate to confess, I myself had ordered him. Incidently, this man Carson is now on the permanent staff of the Center. We may have to use the same trick again, you know."

"Well, colonel," said the general in charge, "with the new predictor material now in the hands of every battery of the national screen we are insured not only a fighting chance, but an almost complete defense against attack. The whole country joins me and the members of my staff," his hand waved to the constellations of official stars, "in thanking you and congratulating you on a job well done."

The formality slipped away and the general smiled. "There will be The Legion of Merit for all concerned. But the thing I like is that riflemen can lift up their heads again. The war is not all machines any more."

"No, sir," said Brayle.

"Now, where is this Carson, the man you used. I want to meet him," the general said.

"I'm sorry, sir," Brayle said, "He's on leave."

"Leave? At a time like this?"

"Well, sir, the man was used to the utmost after a stint in the guardhouse. We don't need him right now, so he went back to the north woods.

"Solitude, eh," said the general.

"No, sir," grinned Brayle. "Duck hunting."

THE END

THE REFERENCE LIBRARY

BY P. SCHUYLER MILLER

ANTI-SCIENCE

This month's column, as it must occasionally, will ramble over several topics of unfinished business. We'll begin, however, with a look at some of the implications of a letter from Freeman H. Quimby of the Office of Naval Research, published in the January 29th issue of *Science*.

Mr. (or it may be Dr.—scientists don't belabor the distinction unless they're running correspondence schools) Quimby is writing with the negative *imprimatur* of the Navy: "The opinions expressed herein are those of the author and do not in any way represent official statements from or reflect the policies of . . ." His theme: "Unpopular Science"—in fact, the rise of *anti*-science.

The occasion which brought the writer's ideas to a head was a meeting of representatives of federal agencies sponsoring biological and medical research, at which travel and security restrictions on scientists were under discussion. It certainly can not have escaped the attention of readers of this magazine that it is becoming almost impossible for any leading American scientist to attend a meeting held abroad, or for Europeans to come here. If there is not downright prohi-

bition, passport visas are conveniently held up until the meetings are over. Nor does this state of affairs pertain only to men who might conceivably carry "secrets" of military or security value out of the country: every kind of science, including archaeology, seems to be under surveillance.

It is Mr. Quimby's belief that this reflects a growing distrust of science and scientists.

He supports his contention with a scattering of quotes from recent speeches, articles and books, of which I will repeat a few:

"Science is in conflct with society . . . Science has failed . . . Science has become a passion and a luxury . . . A cult of men in white coats . . . A sacred cow . . . It will destroy civilization . . . It must not be permitted to go on a rampage . . . It is morally incompetent . . . Scientists are valuable but untrustworthy.

"There is a steady hunger for irrationalism—unscientific and *antiscientific* attitudes of mind.

"There is a widespread tendency in the public mind to identify science with destruction . . . A revulsion against science is said to be in the making . . . Let's demand a moratorium on science."

Mr. Quimby suggests several possible sources of this attitude. For example, there is the concept that science and religion are antitheses and that science is, therefore, responsible for abandonment of moral principles and ethical standards--the "good old verities." There is the internationalism and non-nationalism of science, which appears to the uninformed to be a willingness to "give secrets" to an "enemy." There is the ivory-tower clannishness of many scientists and their own ridicule of and unwillingness to study some fields of phenomena — the psi phenomenon, for example—which laymen have reasons of their own for accepting.

There is the disparity between newspaper and magazine claims for the achievements of science (cancer cures, wonder drugs, green men from Venus in flying saucers) and actuality —with scientists held to blame for not making good the claims they never made. And there is "the extraordinary scientific illiteracy in America even among intelligent, educated people—ignorance of the basic precepts without which there would be no science at all."

There's meat for several columns, letters and editorials there. The question I want to raise is: to what extent has science fiction contributed to this attitude.

We've made the "mad scientist" a stereotype in science fiction. We've inflated him into whole societies of mad scientists. We've shown them developing weapons which slaughter whole races "for their own good," which destroy planets, blow up suns and obliterate the universe. We've shown science wielding a magical

super-power and doing it with little or no sense of responsibility.

These things have been in the nature of a family joke to fans: "World Wrecker" Hamilton, and all that. From the writing and editing point of view these stereotypes have had good and sufficient reasons for existing. A story, to be a story, must have conflict. Since this is a science-fiction story, the hero will probably be struggling against an opponent who has powerful forces at his disposal. And who can handle such forces? Obviously, only a scientist. Science fiction *requires* scientist-villains in a large proportion of our stories.

By the same token (and I've seen this over and over in fan discussions and in a seminar I conducted for Buhl Planetarium), science fiction—again for reasons of plot, novelty, and a gimmick—consistently treats non-science as established fact: time travel, levitation, lost races, supermen. Professional science scoffs at these things, or ignores them. The public reaction is that "science" is hiding the truth and keeping manifestly powerful forces to itself.

In science fiction, quite as a matter of course, we show sciences and scientists fighting tooth and nail to achieve domination over the hero and all his kin. The unsophisticated reader—the novice or the unbalanced crackpot—identifies himself with the hero. Result: scientists are against *him.*

Naturally, I'm not pretending that the stereotypes of science fiction have undermined the attitudes of the American people. We're not that big or important, in the first place, and all but a very few of us understand that a story is a story.

But science fiction is growing outside of the family, outside the neighborhood. The big general circulation magazines are taking it up; TV; the movies. Knowing nothing much about it as a form of storytelling, they reproduce in all seriousness the same stereotypes that they find common in "main line" magazines like this. With this difference: they're reaching millions where we reach tens or hundreds of thousands, and their readers aren't "in" on the family jokes.

Sure—it's still a story—but the people who read the *Saturday Evening Post* and *Collier's* and the women's magazines like to think that the most outrageous soap-opera is or can be "real." It can happen to them. That's psychological, emotional identity of a degree that I'm sure no science fiction fan achieves—though there *was* the Shaver episode. And there can be unconscious, emotional acceptance that villainous scientists are "real."

Mr. Quimby is writing of the responsibility of scientists to combat anti-science with reason, to bring about an understanding of science as a force which has divided our world from a subsistence level of small-farm agriculture, ridden with disease and privation. Fond as we are of our private

games, we share some of that responsibility.

* * * * *

I've found the source of that attack on the statistics of ESP, to which I referred vaguely a month or two ago. The original source is a statement or paper by G. Spancer Brown of Oxford University in the British weekly, *Nature;* it was reported under the title "The Calculus of ESP" in the "Science and the Citizen" section of *Scientific American* for October 1953, and a letter of refutation by Robert H. Thouless of the Duke University Parapsychology Laboratory, and reply by Mr. Brown, are in the February 1954 issue.

Brown, as I said before, questions the entire basis of the statistics by which the psi experiments have been evaluated at Duke and elsewhere, and particularly our concepts of "randomization." He reports an experiment of his own, matching digits between arbitrarily chosen columns in a table of random numbers, which gave a proportion of "correct guesses" well above the mean expectation, and of the same order of magnitude as the effects accepted by Rhine and others as evidence of clairvoyance or telepathy.

Something, he says, is basically wrong with our ideas of chance and randomness as they apply not only to psychic research but to zoology and other fields.

It is at least possible, Dr. Thouless points out in his rebuttal, that ESP was working in Mr. Brown's "arbitrary" choice of columns to be matched, or, farther back, in the make-up of the "random" table which may actually have a hidden, built-in bias.

Pro or con, the possibilities are interesting.

* * * *

I've had around since some time last November a letter from Senor Antonio V. Alvarado, Paseo de Marti No. 203, Havana, Cuba. He has a legitimate complaint, to which I have no answer, but it may be that some other regular reader can help out.

The problem is that American science fiction books bring outlandish prices in Cuba: Dover's collection of Wells' stories, for example, the equivalent of $8.00 and other books proportionally if you can find them at all. And, Senor Alvarado complains, the really excellent buys in Doubleday's Science Fiction Book Club — top books at around a third the cost of the original edition — are restricted to readers in the United States and Canada. Latin American readers can't subscribe.

I'm not in a position where I can very conveniently check Doubleday on this, but I wouldn't say the situation is entirely their fault. In the first place, the gap between $3.50 or $3.95 and $8.00 for the Wells anthology is presumably due to the Cuban tariff — and that is something Sr. Alvarado

is in a better position to change than we are. In the second, this boost of approximately one hundred per cent would certainly apply to the Book Club books as well as any other — and the prices in the Doubleday ad can be met only in the United States and Canada. (In the laboratory supply business which now employs me we have to print a different Canadian edition of our magazine, *The Laboratory*, with corrected Canadian prices on instruments, chemicals, et al.)

Off the cuff, I have two suggestions: One, it may be that the tariff differential on secondhand books is not so great, and that one of the well established dealers in fantasy and science fiction can supply Sr. Alvarado good used copies of recent books at a more reasonable price. And two, maybe Operation Fantast can help somehow.

Operation Fantast — remember Dirce Archer's guest column on British science fiction? — is the British fan club which turned into a fan *service* organization. Its Trading Bureau is certainly worldwide in its operation and works on a cash or swap basis.

For full information I suggest that Sr. Alvarado—and anyone else interested in science fiction overseas — write to:

Capt. K. F. Slater
13th Gp. RPC
BAOR 42
c/o GPO, England

By summer's end Captain Slater expects to be out of the army—he has been operating with high efficiency from Germany—and back in England. I'll try to revise his address for you when I get a new one.

* * * * *

Incidental intelligence: Try recent issues of *Journal of Chemical Education* for a series of articles by Isaac Asimov on the behavior of atoms. In "The Elementary Composition of the Earth's Crust" (January 1954) he shows that a change in focus from weight of atoms to number of atoms produces some interesting changes in our ideas of the most common elements. By weight, our bodies are roughly 60% oxygen; by number we're over 60% hydrogen. Previous articles have dealt with natural occurrence of radioactive isotopes.

* * * * *

Dyed-in-the-wool collectors among you have undoubtedly bought the first two Polaris Press special editions. These were "The Heads of Cerberus," by Francis Stevens, and "The Abyss of Wonders," by Perley Poore Sheehan, boxed, on good paper, for $3.00. Both came from the magazines of about forty years ago and were considered "classics" of their time.

Lloyd Eshbach reports that to maintain this project for collectors he will have to sell at least fifteen hundred copies of each title. He has actually sold about seven hundred, and hence has lost money on the deal. He wants to know a couple of things:

(1) Will enough of you pay $3.50 or $4.00 for such classics so that he can raise the price, cut his print order to seven hundred fifty copies (twice as "limited" an edition as before), maintain his quality, and make ends meet? (You're frequently paying that or more for new titles of less worth—much less from the collection angle.)

(2) What classics—both fantasy and science fiction—do you want Polaris Press to reprint? What Eshbach actually gets, of course, depends on what he *can* get. Heirs of the original copyright owners may be impossible to find (and it takes fifty-six years, usually, for a book to get into the public domain), or have exalted ideas of what they should be paid now that Grandpa's "great" novel is to be recognized as a fine-press classic.

He'd like your suggestions, which you can send directly to him at P.O. Box 159, Reading, Pennsylvania, or to me at P.O. Box 1573, Pittsburgh 30, Pennsylvania. Titles proposed, if Polaris Press is continued, include: A. Merritt's "The Metal Emperor" (his only novel never in hard covers); Homer Eon Flint's "The Planeteer" and "King of Conserve Island," also his "Lord of Death" series; the old Street & Smith classics, "Round Trip to the Year 2000" and "Castaways of the Year 2000" by William Wallace Cook; J. U. Giesy's "Palos" novels; Stevens' "Claimed"; Sheehan's "Judith of Babylon"; George Allan England's "Empire in the Air" (I'd rather see something like his "Darkness and Dawn"). There might also be collections of short stories by hard-to-get authors. I'm plugging for the Arthur Train–R. W. Wood "Man Who Rocked the Earth" and its sequel, "The Moon-Maker" (the latter never in book form), maybe even with Professor Wood's own photographic illustrations.

* * * * *

And I hope this is in time to remind you that your editor, John Campbell, is Guest of Honor at the Twelfth Annual World Science Fiction Convention, to be held in San Francisco, California, September 3–6. As a warmer-up there'll be the Westercon with Jack Williamson as The Cheese—doubtless the very durable kind of which the Moon is made. A dollar to "The S-F Con, Box 335, Station A, Richmond, California" gets you a membership, souvenir booklet, and bulletin after bulletin after bulletin from the Committee.

I don't *know*, but since it's California I wouldn't be at all surprised if they decide to give away Marilyn Di Maggio as a door prize.

KILLER TO COME, by Sam Merwin, Jr. Abelard Press, New York. 1953. 251 pp. $2.75

You won't find this science-fiction-cum-mystery in even the same class with the author's "House of Many

Worlds." It's the interference with the past theme again, this time told by the people in our time whose actions are being guided from the future. The mechanism: some form of never-quite-specified mental possession.

Dr. Julius Conrad of Wellington Institute, a kind of New England Institute for Advanced Studies, has evidence that these time-tamperers have been working for centuries, whittling away at their past in order to shape their own era. Before he can divulge it, he is killed—and in view of his reputation as a ladies' man, there is more than a slight chance that prosaic motives may have overridden or mingled with the fantastic. Hank Sanford, would-be novelist and successful crime-crusading journalist, takes a hand in the investigation on behalf of the Institute—and is promptly a target himself.

It's as smoothly done as you know a Merwin story will be, but it might just as well be a mystery for all the future really asserts itself as more than an old-fashioned Edgar Wallace or Sax Rohmer menace.

SECOND FOUNDATION, by Isaac Asimov. Gnome Press, New York. 1953. 210 pp. $2.75

Herewith Isaac Asimov and Gnome Press conclude the book publication of the chronicles of the Foundations, which appeared in these pages in 1948–49. The whole comprises good, sound, middle-of-the-road science fiction with a carefully hidden surprise in the location of the Second Foundation, but nothing extraordinary.

These are the stories of how first the Mule, the mutant master of the galaxy whose existence and powers could not be foreseen by Hari Seldon's statistical psychohistory, and then the members of the shaken First Foundation try to find and dispose of the master-psychologists of the hidden Second. I'm sorry that the Mule had to pass out of the picture so quickly, for he was one of the few three-dimensional characters in the history, but we are given teen-age Arkady Darell in his place, and that is by no means a loss.

If you've like the "Foundation" yarns, here they are in three well made books from Gnome: "Foundation," "Foundation and Empire," and now "Second Foundation." If you want one, you'll want them all.

MORE THAN HUMAN, by Theodore Sturgeon. Farrar, Straus & Young, New York. 1953. 233 pp. $2.00; Ballantine Books, paper, 35¢

When someone (not I!) tries to select a "best" science-fiction novel of 1953 he is going to have to choose among some of the finest books of any year, including Bester's "Demolished Man," the Pohl-Kornbluth "Space

Merchants," and now Theodore Sturgeon's "More Than Human." For cleverness I'd give it to Bester, for satire to Pohl and Kornbluth, but for feeling it is Sturgeon every time.

"More Than Human" is expanded from the classic novelette, "Baby Is Three," which forms its central part. As a story, I think the original episode is more memorable, as A. Merritt's "Moon Pool" and "Face in the Abyss" had more impact than the novels he built on them. Yet the author could not have said what he wants to say about humanity beyond man without expanding and developing his theme as he has done.

First we see the idiot, "Lone," feeling his way into his fabulous powers and gathering around himself his little community of equally fabulous children, all of them rejected by the "normal" world. We learn the hideous story of Alicia Kew's girlhood. We see the hunted child, Gerry, groping for the true meaning of the relationship among them—the thing Lone calls "Homo gestalt." And then, in the final section, we see how insane this superpersonality of supernormal powers can be without the balance-wheel of one more special talent.

There is no need to tell any writer of ASF how well Sturgeon writes. He has Bradbury's style and poetry without ever running thin, as Bradbury so often does. His stories are always about real people, whose basic trouble is that they are only people, with the limitations as well as the powers of people. "More Than Human" is one book of 1953 that you must read.

THE LIGHTS IN THE SKY ARE STARS, by Fredric Brown. E. P. Dutton & Co., New York. 1953. 254 pp. $3.00

The ability—and willingness—to write science fiction which diverges from the most popular formulas of the day (and to publish it when it is written) will do more to earn status for the form than all the Hollywood hysteria.

I don't suppose there is enough plot or "story" to make Fredric Brown's fine "The Lights in the Sky Are Stars" acceptable to any of the best current magazines. Nevertheless, it is Brown's best science fiction and certainly one of his best books.

This is the theme of Heinlein's "Man Who Sold the Moon," with a difference. Heinlein's hero remained somehow impersonal and symbolic; Max Andrews, the one-legged spaceman who "sells" the Jupiter rocket, is intensely personal and the story is really his and not that of our years in the future of mankind.

Max lives in a time when the impetus to space is being lost through inertia, disappointment, and the active opposition of a conservation bloc. He wins an election for Senator Ellen Gallagher; wins her, too. Between them they build the physical and po-

litical plans which will take a man to Jupiter's moons—and Max Andrews, even at sixty, will be that man. But—and the "but" is not in melodramatic machinations, but in Max's own self.

This probably won't be popular with a wide segment of the space-happy younger set. They may not even consider it a space story. But it's an indication that Fredric Brown, along with all his marvelous gimmicks in science fiction and mystery, has the stuff of lasting books in him.

COSTIGAN'S NEEDLE, by Jerry Sohl. Rinehart & Company, New York & Toronto. 1953. 250 pp. $2.50

Here is a theme that's been used over and over, much better reading than it has any right to be, and several notches ahead of the author's "Transcendent Man."

Dr. Winfield Costigan persuades Inland Electronics to give him a million dollars for construction of a "Needle" into whose "Eye" living matter can be thrust, only to disappear. Naturally, people go through the larger Needle; first one or two, eventually a couple of hundred. They come up in another "plane," build themselves another civilization and another Needle, have to decide whether to go back or hold to their harmonious new life.

Technically, the book is full of holes. There's no earthly physical logic behind a plane-switcher which will take only living matter—or non-living such as bones, hair, skin which is intimately attached thereto—although the twist has been used more than once before without protests from the readers. It's a bit less excusable that with the second Needle they can stick their heads in and look around at the landscape, whereas with the first they do but don't see anything—must have been dark or something, for when they get through bodily there's plenty of sun to tan their naked hides a glorious brown.

But, as "The Haploids" proved, Jerry Sohl is a smooth writer who will eventually give us a humdinger if he'll take the trouble to weld it together instead of using string.

STAR RANGERS, by Andre Norton. Harcourt, Brace & Company, New York. 1953. 280 pp. $2.95

I don't know whether the publishers consider Andre Norton's new book a juvenile or not. It's so only in having a relatively simple plot, full of action. And it's a top-notch picture of a strange world. The one criticism I've heard is that the people all look like those of our time: but I suspect people will have changed no more, basically, by 8054 A.D. than they have since the dawn of urban civilization.

At the breakup of the First Galactic Empire, the Stellar Patrol ship *Starfire* crashes on a distant planet. Four

Rangers, two nonhuman, one semi-human, and six men of the Patrol, including their badly wounded commander, survive. It is up to the Rangers to find food, water, shelter until their ship can be repaired—if it ever can.

So the Terran Kartr, the night-prowling Faltharian, Rolth, the reptilian Zinga, the bird-man Fylh set out. They find a deserted city where another group of castaways, ruled by Vice-Sector Lord Joyd Cummi, has taken refuge. And presently they find themselves fighting for their lives, escape from the city, and learn the amazing secret of the deserted planet.

It's as good adventure stuff as is being done: maybe not up to Miss Norton's "Star Man's Son," but top grade.

333: A BIBLIOGRAPHY OF THE SCIENCE-FANTASY NOVEL, by Joseph H. Crawford, Jr., James J. Donahue & Donald M. Grant. Grandon Co., Providence, Rhode Island. 1953. 80 pp. Paper: $2.00

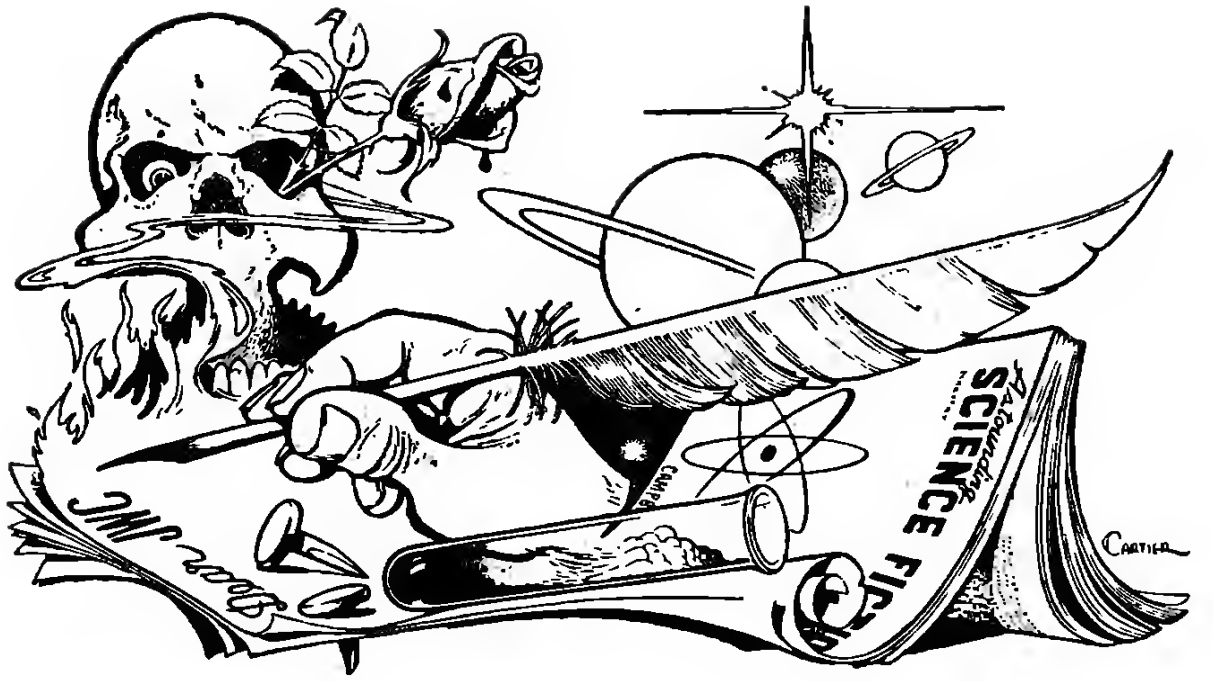
This pamphlet anticipates the collection of synopses of outstanding science fiction and fantasy novels which Everett Bleiler and T. E. Dikty promised would be forthcoming after the publication of their "Checklist." It contains synopses in between one hundred and one hundred and fifty words of (obviously) three hundred thirty-three books which the compilers consider are truly outstanding. American novels published before 1951—with some worth while English books—are included.

The booklet will be a very useful tool to the collector who has no idea what some of the older titles are like. (Must I go through the motions of insisting—"authorities" to the contrary—that these older books, even those of Verne, Wells or Haggard, are *not* in "every library" and are, on the contrary, thrown out by formula as soon as they reach a certain age or certain dilapidation?)

It has the obvious flaws. You, like me, will object to the inclusion of some books and the exclusion of others. You'll wonder where J. Leslie Mitchell's "Last American" is, and why Robert W. Chambers' "Hidden Children" (a historical novel in which an Iroquois medicine-man says "Boo!") is included. You'll wonder how anything by Charles Williams could be missed and why the de Camp-Pratt "Incomplete Enchanter" is listed twice (woops! one of 'em is "Genus Homo," from the synopsis—sorry for the boner).

For all its faults, this is a useful book and may save you several times the $2.00 price when you're tempted by a rare-book list.

THE END



BRASS TACKS

Dear John:

Mr. William P. Phillips of Chicago, Illinois, has written to tell me that the manner in which I indicated Mark Annuncio's name was to be pronounced in my story "Sucker Bait" was wrong. I offered the alternatives Annunseeoh and Annuntseeoh and said the latter was right. Mr. Phillips says both are wrong and that the correct pronunciation is Annunchoh.

He is, of course, perfectly correct if we allow ourselves to be guided by twentieth century Italian usage.

However, the name Annuncio cannot be traced back among Mark's ancestors further than 53rd Century Italy and this involves certain complications. The system of pronunciation in 53rd Century Italy has the "c" vocalized into the sound of a hard "g" except when followed by "io" in which case it is pronounced, as indicated in the story, as "ts." The "io" ending by the way is a disyllable to persons of English-speaking habits—53rd Century English, of course—but to 53rd Century Italy, it is approximately half-way between "ee-oh" and "yoh."

A similar problem arises in connection with my microbiologist character Miguel Antonio Lopez y Rodriguez. By 20th Century Spanish usage, the name Rodriguez represents his moth-

er's maiden name and he would be known as Senor Lopez—his father's name. As perhaps some of your readers know, the feminist revolution in Western Europe in 4712 introduced the temporary habit of cognominal descent along the maternal line. This persisted in Spain for centuries after matters had returned to their earlier state in the rest of Europe. The microbiologist is, therefore, quite in order in calling himself Rodriguez. If any of your readers noticed this apparent error, I hope they are satisfied with my explanation.

And all thanks to Mr. Phillips for raising the question and allowing me an opportunity to explain.—Isaac Asimov.

And the only reason it's even that close to 20th Century forms is, I suppose, due to sound recordings tending to stabilize pronunciations. Just look what's happened to Greek and Latin in three thousand years!

Dear Mr. Campbell:

Harking back to my previous letter about there being noise in any communications system, I'd like to add a few comments on your editorial "Limitation On Logic" in which you stress the "fact" that " . . . the real physical Universe contains noise, and always will contain noise." You further state that ". . . the system of mathematics does not (contain noise)."

Mr. John P. Fairfax, however, in the Brass Tacks section of the same issue offers the observation that ". . . mathematics . . . exists only in your brain and mine."

On the above "a priori" statements I build my argument, first amending Mr. F's contention to read: "Mathematics exists in your brain, mine, and in our communications between each other." Communication is noisy. Mathematics, depending as it does on the association-filled interpretations of the human mind and the cumbersome and ambiguous communications systems—languages—we have so far evolved, certainly, therefore, could not be noise-free.

Mathematics represents, or is *analogous* to, the real physical universe. Could it be that the real universe, with its discontinuities and "exceptions to the rule," is in reality the noise-free system—that we are introducing noise in trying to force it to conform to our admittedly noisy concepts? Could it not be that mathematics is the rebel, the nonconformist to things-as-they-are?

It has been argued that mathematics is a language in itself, free from ambiguity. But could you teach it to anyone who had not already at least partially mastered a general-communications language? I contend that mathematics can be a second or auxiliary language, but never a first. It always depends on knowledge of another, association-filled language. Being so dependent, it seems highly

illogical that the "language of mathematics" could possibly be free of noise!—Larry Maddock, Eaton Rapids, Michigan.

No, the system "mathematics-and-the-universe" is not noise-free. But the system "mathematics" holds that it is! For example:

$2 \times 3 \times 0 = 0$

But 2 ft. × 3 ft. × 0 ft. = 6 sq. ft.

Dear Mr. Campbell:

I've just finished reading the first installment of Isaac Asimov's "Sucker Bait" in your February issue. As usual in Asimov's stories, the writing is excellent and one's interest is superbly held by the "hooks" he generally inserts at the beginning of a story.

However, there is something that worries me. Is Asimov aware of the full story of the so-called "Trojan" position of an astronomical body? The effect was discovered by Lagrange in the eighteenth century as a special solution of the three-body problem in celestial mechanics. There are two requirements that must be fulfilled for an object to pursue an orbit in the Trojan position. First, its mass must be negligible in comparison to the other two components of the system. Second and most important the ratio of the masses of the other two components must not be less than 1 to 25. If the mass ratio is less than 1 to 25, the system will not be stable. Thus, the sun and Jupiter (Mass ratio 1/1047) can form a stable Trojan position which we actually find exemplified by two groups of asteroids, one preceding and the other following Jupiter in his orbit at 60 degree distances. Also, the Earth and moon — mass ratio 1 to 81 — may form a stable system.

But Asimov's two components of a binary system, one of which is two-thirds as massive as the other would never be able to hold a planet in the Trojan position. As a matter of fact, I don't think anyone will ever find that particular situation with regard to planetary companions of binary systems because stars differ less in mass than in any other respect. A catalogue of binary systems in front of me now shows very few cases where the mass ratios of the components are much higher than about 1 to 3. Oddly enough, in June 1944, you had a story "Trojan Fall," by Hal Clement —an astrophysicist I believe—which hung on just this mass ratio aspect of the Trojan solution to the three-body problem. Actually, I may be anticipating something in Asimov's plot here. Maybe he intends to use this set of facts in solving his mystery later on.

This whole discussion brings me to something else I have been intending to write about for a long time—the places some of your writers put planets. I've seen them put around Betelguese, Rigel, Alpha Centauri, Deneb et cetera, et cetera. They've been put in double, triple and multiple systems.

They've been put with class O, B, A and M supergiant stars. They've been put in systems with White Dwarf components. None of these places is at all satisfactory for the development of a decent stable planetary system. Indeed, for some of them, it can be shown that planets would likely never have developed at all or even had time to.

What would constitute a stable system? Well, the planets must not be overly perturbed in their orbits—that is, not have orbits of high eccentricity—very elliptical—and they must be able to keep pretty much the same orbital path for long periods of time. Also, the amount of light and heat received by the planets must not vary overmuch during long periods of time. These conditions are well satisfied in the solar system where the sun constitutes an overwhelming controlling mass in the center and the orbits of the planets are very nearly concentric circles. Further, the sun is single as far as we know, and the planetary orbits are subject to no perturbations by other objects of stellar mass. Also and just as important, the sun is a nice average G-O star whose luminosity remains constant within a few tenths of one per cent. It has apparently managed to do this since the first geological records were laid down in the rocks. But take a look at the conditions prevailing in a binary system. The two suns on the average will revolve around their common

center of gravity in fairly eccentric orbits that may have them 80 or 100 A.U. apart at one time and thirty or forty years later have them five to ten A.U. or even less distant from one another. The poor planets in this system will have a hard time finding any stable orbits. As a matter of fact, their orbits will be liable to be very eccentric and as Asimov states, they will probably come close enough to one or another of the two stars to melt iron at their surfaces. Two suns at planetary distances from one another are just not a good prescription for having any sort of usable (Oxygen-water) planet in the vicinity. Indeed, it is possible that a fairly small Earth sized planet might not be able to condense out of the primordial nebula due to the disturbances of the extra star in the system. Apparently, a planetary colossus could condense out because such have been discovered (61 Cyngi, 70 Ophiuchi). If the planet is far enough away from the system to revolve around the common center of gravity of the two stars, it is too cold to be of much use.

There is one situation in a binary system where one could have a stable planetary system (or even two)—this would be in the case of a binary whose components were separated by a good five or ten thousand A.U. Each might then be the center of its own system and with the great separation between the two, mutual perturbations would be very unlikely. There are such binary systems known. Another possible case—that of planets revolving around the common center of gravity of two stars that are separated by only a few million miles is possible, yes, but improbable. Two such stars will pull a great deal of each other's material out from mutual gravitational attractions and distribute it around the system. Beta Lyrae is such a binary. It is probable that the material distributed in the system would by friction effects considerably alter the planetary orbits, possibly causing the planets—if any could be born in this system—to gradually spiral into the suns.

Thus I think it's fairly safe to say that a star must be single—or practically so—in order to have any planets that our future interstellar explorers might be interested in settling. But even if a sun is single, that does not exhaust the possible reasons for excluding it from having a normal set of planets that our explorers will be interested in. I mentioned at the beginning that writers were in the habit of placing planets—often ones which are Earthlike or at least the abode of some intelligent life form—around supergiant stars like Rigel or Betelgeuse. Why not? Well, take Rigel as a good example. The catalogues inform us that this is a supergiant star of spectral class B8 at a distance of some 540 light-years. At this distance, its luminosity figures out to be about 21,000 times that of the sun. Now

there is one interesting fact about such a star that can be deduced from its luminosity alone and that is this: that unless it has sources of atomic fuel which are at present undreamed of by terrestrial physicists, it cannot have been shining for anything like the two or three billion years that our sun has been in existence. There just wouldn't be that much hydrogen to convert into helium. The conclusion is obvious: Rigel is a young star. It has been a discrete object for possibly as little as ten million years, maybe as long as one hundred million. Neither of these periods is much toward developing any Earth type planets or intelligent races. The star simply hasn't been in existence that long. For that matter, there is not much hope of doing so in the future. Rigel is a spendthrift and will shortly—in a hundred million years or so—run out of hydrogen and probably undergo a series of catastrophic adjustments to the fact. These considerations apply to almost any supergiant star of high luminosity. None of them can be old enough to have had the necessary billion or two years to develop planets with oxygen-water ecologies and possible intelligent life.

Why no White Dwarf stars in the system? Well it's just possible—there is no definite proof on this yet—that a white dwarf is the end product of a massive star which, in collapsing upon itself to attain the fantastic densities characteristic of this type star, has

blown most of its substance off in a violent supernova explosion. This explosion will not improve the physiognomy of any planets in the immediate neighborhood. For that matter, a planet as close to a supernova as the Earth is to the sun might very well be vaporized. If these theories of the origin of White Dwarfs have any truth in them, you aren't liable to find any usable planets in the vicinity of any white dwarf. The precise mechanism of the collapse of the star to form the neutron core has not been agreed on yet, but it seems to occur when a very massive star—such as Rigel above—runs out of Hydrogen fuel. There is then no radiation pressure to hold up the outer layers of the star and they collapse. This is, of course, a terrible simplification, but that's the general idea anyway.

So it looks much as if our future explorers must look for common ordinary main-sequence stars, preferably single ones for their planets. There's no trouble there—99% of the stars in the galaxy belong to the main sequence in classes F, G, K and M. The trouble lies in finding single stars. There are a lot of binaries. In our immediate neighborhood—say fifteen light-years or so—the most likely star would probably be Tau Ceti—Spectral class Ko, luminosity about one third that of the sun and—so far—a single star.—Charles M. Williamson, 125 E. 52nd Street, Savannah, Georgia.

This one needs explanation. Isaac Asimov's story "Sucker Bait" was written around a situation outline supplied to him; it is one of three stories, three different authors are doing, on a single situation-outline. Each author was given the same basic material—a description of the Lagrange system, Troas, and the situation as it existed when the expedition arrived at Troas. Each author's problem was to write a story explaining the disappearance of the First Expedition.

Asimov did "Sucker Bait." Poul Anderson did his story "Question And Answer," now appearing.

It wasn't Isaac and Poul who missed that 25-to-1 mass ratio; it was a couple of other guys. You can include me in on that, too; I didn't know it either!

Dear John:

Mr. Rickert—ASF, Dec. '53, p. 155—and Mr. Nelson—*ibid.*, Mar. '54, p. 145f—have raised the objection to phonetic spelling that no one system can fit all dialects of a language, and who shall say which dialect shall be a basis for a rifoormd oor8ografi?

This is a legitimate point, but the insuperability of the obstacle depends upon the language. It depends on how many dialects there are, how widely they vary, and their relative importance. The "importance" of a dialect may be measured by the number of people who speak it, or—and this is

largely a subjective criterion—the standing of the dialect in the culture of the glossa—my word for all the people speaking a given language.

With English the problem is not hard. If we divide the English glossa into (a) the United States and Canada, and (b) the remaining countries of the Commonwealth and the Irish Republic, we see that in (a) there is no marked cultural hierarchy of dialects, but that one dialect has a big numerical preponderance. This is General American, spoken with but slight variations by at least two-thirds of the North American part of the English glossa: everywhere but in eastern New England, the New York metropolitan area, and the South.

In the case of (b) there is no such quantitative bias but a strong qualitative one. The upper-class dialect of southern Britain, the so-called public-school dialect or Received Standard English, is taught as the "official" form of the language over most of the Commonwealth and is generally accepted as "correct." Of course any dialect is "correct" only in the anthropological sense in which clothes or table-manners may be deemed "correct," but in this case the fact that one dialect is so favored simplifies the orthographic problem.

An orthography, then, that fitted both General American and Southern British would be acceptable to a large majority of the English glossa. And the differences between the two are not insuperable. Ignoring minor differences of vowel-values—such as the wider diphthongization in SB of the vowels of "lie," "hay," "hoe," and "who"—the main differences are: (1) SB drops *r*-sounds or reduces them to a mere schwa—like the *a* in "ago"—when final or before a consonant, and (2) differences in the values of the low vowels in two hundred-odd words like "ask," "data," "rather," "fault," "off," "sorry," "gone," et cetera.

These differences can be handled on

the principle of using whichever usage is the more conservative or best retains distinctions between words that in other dialects are homophones. So we can write "sought" as /soot/, but "sort" as /soort/, though a speaker of SB pronounces the second exactly like the first. The silent *r* would bother him no more than it does now. The same applies to "Sioux" /suu/ and "sue" /siu/, though in this case it is the GA speaker who levels the words—pronounces them alike. If we spell "ask" and "off" /ask/ and /of/, those who wish to pronounce them /aask/, /oof/ can do so. When too wide a gap occurs, as with "shone" and "asphalt"—GA /xoun/, /asfoolt/; SB /xon/, /asfalt/—we can use alternative spellings, as we do now with words like drouth/drought, and let the writer take his choice. As the Eastern and Southern American dialects are in many respects intermediate between GA and SB, a system that fitted both GA and SB would fit these, too.

In other words, there are enough practical difficulties to spelling-reform, in the form of human inertia and irrationality, without bringing up obstacles that do not really exist.—L. Sprague de Camp.

Wonder why that "inertia" exists though? Does personality have mass? Does a belief have momentum? The effect of inertia certainly exists, though!

I am told that phoneticists have recognized a new consonant, known as the *digito-labial consonant.* It is produced by stroking the lower lip, producing the sound *buh-buh-buh.*

It is principally used by those who say "indubitably."

Continued from page 5

society. And no society can, actually, remain static successfully.

Let's consider two groups; the true, rank amateur, and the tyro, or inadequately trained semiprofessional. In the field of humanics, personal opinions can weigh so heavily that it is exceedingly difficult to deal with that field objectively; the physical sciences, however, allow of unarguable demonstrations. We'll stick to the physical sciences, but insist that there is an extrapolation that must reach into the humanic fields as well.

The rank amateur is fairly easily defined; the tyro needs some definition. Let's take as a trial definition, "a partially trained, inadequately experienced student of a highly specialized field of professional study." Arbitrarily, we can say that undergraduate, and graduate students will be considered tyros; individuals who have not achieved a doctor's degree or its equivalent.

Now on examination of a list of Great Scientists, I think you'll find that an astonishingly small number of the great discoveries remain if we eliminate amateurs and tyros! Copernicus was a doctor of canon law, a physician, a financier, and an amateur cosmologist. Newton was a tyro; his great work was all done before he reached twenty-six, the age of the graduate student. His adult years were devoted largely to theology and politics, after two years of complete mental failure.

Pasteur was a chemist; he solved the great basic problem of medicine. With respect to the study of disease, he was a rank amateur.

Bell Labs, one of the greatest of the professional research organizations, and General Electric and Westinghouse Electric were all consciously seeking for a device capable of amplifying an electric current. Lee de For-

est, a tyro-amateur discovered the triode tube.

The nuclear physicists throughout the world, working with the finest equipment, great computers, vast experience, and immense competence and determination have sought ways of achieving higher energy levels in their accelerators.

Three years ago, Mr. Nicholas Christofilos, a Greek elevator electrical engineer, sent the Radiation Laboratory in California a suggestion on how it could be done. His study of the problem was definitely rank-amateur level. Because he was an electrical engineer, he might be called a tyro, but that's the highest rating possible. His mathematical training was completely inadequate.

His suggestion was rejected as not making sense.

The Patent Office has—as this magazine has pointed out—several remarkably weird arrangements in its affairs, but one of them is highly desirable. The Patent Examiner doesn't have to determine whether the invention is sensible or not; it need only be original. Mr. Christofilos got a patent.

Much later, the trained experts at Brookhaven, with the aid of higher mathematics, computing machines, and much experience, reached the conclusion Mr. Christofilos had already reached. The Atomic Energy Commission has settled with Mr. Christofilos on his absolutely sound patent on the strong-focusing principle for multi-billion volt synchrotrons.

This whole sequence of events is a perfect instance of the problem of the amateur—and the problem goes a great deal deeper into the nature of creative thinking than at first appears.

Do a fast reading on that paragraph about the Brookhaven men finding the same answer, and you might get the impression that they were thick-headed fools, lagging long after the brilliant amateur. If you get that idea, you belong to the group we can tentatively title the Type I, or Impertinent Amateur. This is the class of amateur who has earned the "Go way, boy; I'm busy," response from the professional.

If Mr. Christofilos had succeeded in communicating his idea to the Radiation Lab men three years ago—the trained experts, with the aid of higher mathematics, computing machines, and much experience, would have gone over the work, and reached the same conclusion . . . *but in detail*. In other words, the work the Brookhaven men did would have been required in any case. It would, however, have been accomplished a lot sooner, and with considerably less headache, and heartache too, for that matter. It's no great joy for the amateur to be turned down cold; it's less joy for the professional, after three years of hard work, to discover that the amateur has already gotten a valid patent on the idea.

It's a messy way to do business. But

humanity simply hasn't been able to solve the immensely important sociological problem of the amateur. The deviant.

Because there are two types of deviants, and two types of amateurs. The Type II, or Effective Amateur, is indistinguishable from the Type I, the Impertinent Amateur, at the level of what he implies. Both types make statements implying, in essence, "You professionals are wrong. You are going at the problem in a difficult way, and I can show you a simpler method."

That's what Christofilos said; he was absolutely correct, too.

That's what Julius Q. Jerk says also —and he's a thundering nuisance, and a Grade A bore.

The Type I amateur, however, arrives at his conclusions by a process of megalomania. "Those professionals are stupid fools; they don't have the originality I have. If they'd just step aside and let *me* do it, I'd show them they were wrong." This pest hasn't studied the problem enough to have more than a faint glimmering of what the difficulty is. What he needs—but refuses—is a little education in what the unwanted disturbances to easy accomplishment actually are. The proper treatment is "Go 'way, boy; I'm busy. Go read a book—read a dozen of 'em. I'll give you a list of twenty books to read, and then maybe we can talk."

The Type II amateur, the effective amateur, is quite different in his approach. In essence, his thought might be, "These men are highly trained, highly intelligent, experienced, and persevering. They've shown great ingenuity in their development of this method of attacking the problem. They have the finest equipment mankind has been able to produce. They've worked years, learned the technology thoroughly. Their goal is important, they know it's important, and are

working honestly toward it.

"If, with all that to help them, they haven't achieved it—the method must be basically wrong. If there was a practicable solution in that area of research, they'd have found it and used it.

"I haven't their training, their equipment, or their experience. I'll assume as proven that their failure to solve the problem means it can't be solved that way. I won't try to out-expert the experts. Instead, I'll try a completely different approach.

"It *is* possible that they've carried their specialization too far down one track, and that at a lower level, you can switch off to another line of development that isn't blocked."

The Type II amateur, in other words, essentially holds the proposition that the expert is a better man than the expert thinks he is! That if the expert can't do it, it's because the method, not the expert, is incompetent.

The one thing that makes it impossible for the expert to achieve this, in other words, is the fact that the expert isn't willing to say "If I can't do it, it can't be done this way." The amateur, however, can say, "If you can't do it, then it can't be done that way." His high regard for the expert leads him to do what the expert wouldn't do—reject the whole approach.

America is a tyro culture; we have great respect for Europe's great men. Wherefore we happily throw over most of Europe's great cultural traditions—because if they, for all their greatness, couldn't work out a way of living together after three thousand years of trying, the basic method must be wrong.

Europeans, of course, can't do that; it's against tradition. Every European knows the importance of having cultural traditions, and independent nations. So we don't see a United States of Europe.

The tyro, because of his respect for the abilities of his predecessors, is perfectly willing to abandon the methods they tried and didn't succeed at. I'm not going to try solving the General Field Theory problem the way Einstein tried; if he couldn't reduce it by that method, in fifty years of effort, I'd be a fool to try *that* method.

But on the other hand, maybe the approach needed involves study of . . .

And naturally, if you originate the study of flahmstrahl, you are, by definition, the world's one expert on flahmstrahl study. As of 1951, although Brookhaven didn't know it, Mr. Nicholas Christofilos was the world's greatest expert authority on the strong-focusing synchrotron. His studies were incomplete, he needed the help of mathematicians, computer machines, and experimenters with far greater experience than his own.

Currently, Christofilos is at Brookhaven; he and the scientists there are doing the job of mutual helping that produces genuine progress. The un-

beatable team of Amateur & Expert, Unlimited.

Part of the great problem of the amateur vs. the expert, however, is the communication problem; the problem that stopped Mr. Christofilos.

An idea is futile if it can't be communicated from the originator to the man who can apply it. Christofilos' idea was of no use whatever to him; multi-begavolt synchrotrons can only be built by multi-billionaires. Only great groups of human beings can accumulate sufficient surplus wealth to be able to afford investing many millions of dollars in a pure research tool. Therefore, until the idea could be communicated, it was of no use to Christofilos or to the United States. It was the experts at Brookhaven that solved *that* problem; the men at Radiation Laboratory in California failed, and so did Mr. Christofilos.

Because he didn't use the "language of science" adequately for the purpose—his mathematics was home-grown, but effective—Christofilos couldn't communicate in the special language of mathematics. The amateur repeatedly runs into that block; even when his statements are perfectly clear English, they aren't clear technicalese. And the unfortunate thing is that the expert doesn't even realize that he doesn't speak English among his fellows!

Consider this: The Physicist says, "You're crazy, man! You can't induce a man; you can only induce field forces!"

The Statesman: "What nonsense! You scientists haven't the slightest understanding of humanity. You can't induce machines to do anything whatever; no matter how eloquently you plead with them nothing happens."

The Chemist: "Now wait a minute. You can induce reactions to take place in either men or machines, if you just

establish the right conditions."

So—what does "induce" mean in English? What does "attract" mean?

Or shall we go to more complex fields and ask what "emotion" is? The physician is apt to start discussing endocrine excretions, the dramatist to describe postures and expressions, and the other technologists will have a huge number of variations.

If you ask a man if "hare is good to eat," he will almost certainly make a slight face, and assure you it isn't. It happens that *hair* is a far more common word than *hare*, but since both have the same sound-symbol, even in the quite inappropriate context with "to eat," most people will mentally insert the meaning implied by *hair*.

Human language suffers because of a vast problem: We must avoid the Tower of Babel, the excessive use of neologisms. But we must also avoid the problem of inadequate differentiation of terms. Even Babel is better than getting hair for dinner because you want hasenpfeffer.

And buried somewhere in the midst of the resulting confusion is the contribution of the amateurs. Can you imagine trying to do a mathematical analysis of a problem involving twenty different factors, and using only ten different symbols? Suppose we use "e" to stand for "the charge on the electron" and also use it to stand for "energy." The results of your mathematical labors might include canceling out "e" above and below the fraction, and substituting "mc^2" for the charge on the electron because you know that "$e = mc^2$".

You could obtain some really remarkable, and thoroughly unworkable ideas when the number of concepts you're working with is greater than the number of symbols you use in your equations!

You can successfully use "x" to stand for any number of unknowns—provided you don't mix the mathematics from one problem with that from a totally different one. But when the amateur with a real contribution tries to talk to the expert, the expert may discover that the amateur appears to be talking utter nonsense. The expert is guilty of assuming that "x" is always the unknown *he's* talking about.

The more the scientist seals himself off behind a barrier of technicalese, and special word-meanings, the less help he can get from the intelligent amateur. And since he can only escape his own specialty's blind alleys by a certain degree of megalomania, if he can accept no outside help, the prospect isn't good.

Whose job is it to maintain communication with the intelligent and understanding amateur?

Somebody failed; both Nicholas Christofilos and the Brookhaven scientists were shabbily treated by a sociological system that couldn't handle its job of maintaining communication.

THE EDITOR.

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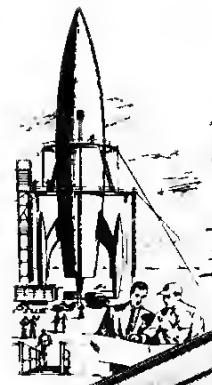

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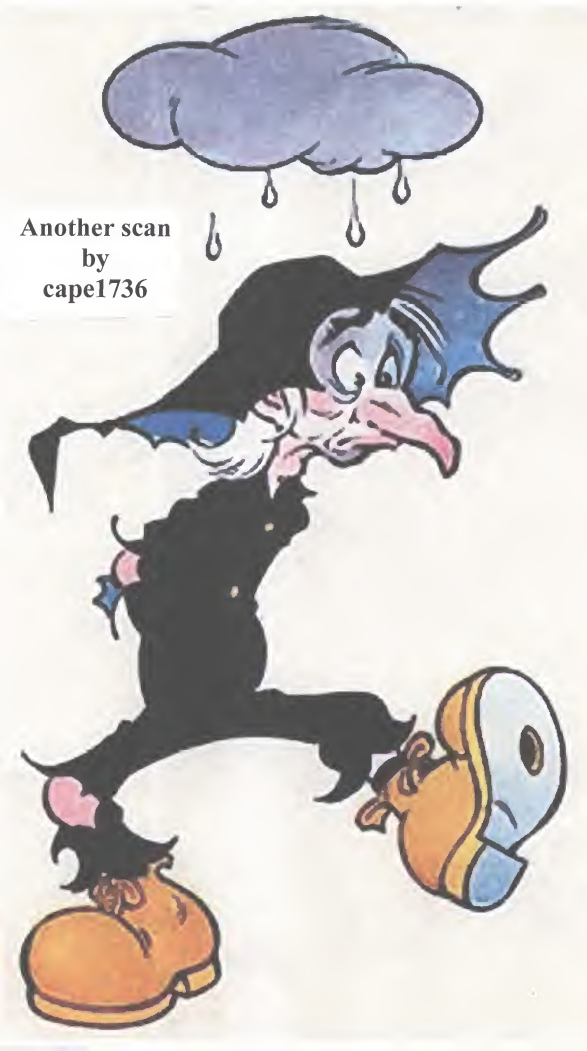
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